THE IRON TRADE REVIEW

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PIG IRON SHORTAGE

IS INDICATED BY TREMENDOUS DEMAND FOR ALL GRADES.

Vessel Builders Figuring on New Contracts—Prosperity of Agricultural Interests—Many More Cars Needed.

In spite of the very great activity of blast furnaces in all parts of the country, every available stack being in operation, there is strong evidence that the production is not equal to the demand, and that, if present prosperity continues, there will be a decided shortage next spring. In some sections, where the product is usually far in excess of the local demand, orders are now being placed for shipments from other centers; for example, melters in the Youngstown district have purchased iron to be shipped a considerable distance and delivered during the first quarter of next year at $17.90 at buyers' plants. Buffalo interests which have been shipping to Chicago and other distant points are receiving heavy inquiries, some of which come from Canada, as the furnaces in the Dominion will not be able to produce enough iron to meet requirements of buyers. There has been great activity in pig iron in the Chicago district, the local product selling at from $19.00 to $20.00 for No. 2 foundry, and southern irons at $18.15 for the same grade. Inquiries at Chicago included 17,000 tons of basic, 10,000 tons of foundry and silvery irons, and many demands for smaller lots. The United States Cast Iron Pipe & Foundry Co. has placed an order for 30,000 tons with Buffalo and Virginia furnaces. The demand for basic and malleable is very strong, the malleable interests being specially insistent upon prompt delivery on contracts. The southern situation is very strong, there being little iron for sale at less than $14.50 for No. 2 Birmingham. High silicon irons are very hard to obtain and quotations on Kentucky and Ohio brands have been advanced. The rumor of a large sale of Bessemer for delivery the first quarter of 1906 is not confirmed, but it is not improbable that the transaction may be closed within a few days.

Lake shipyards are inquiring for from 20,000 to 25,000 tons of plates and are understood to be figuring on twelve large lake freighters. The American Shipbuilding Co. already has contracts on hand for lake vessels which will keep it busy up to June, and if contracts are taken for the vessels now under consideration, the yards will be kept employed up to the close of navigation next year. The car manufacturers are figuring on new contracts which will involve a considerable tonnage of plates.

Rail sales include 25,000 tons each to the Union Pacific and Boston & Maine; 10,000 tons to the Pacific & Idaho Northern; 9,000 tons for the Yosemite Valley; 5,000 tons for trolley lines and many small lots ranging from 2,000 to 4,000 tons. These sales following the tremendous orders already placed, are noteworthy.

The premiums being paid for structural steel have not been reduced. In some parts of the country the weather is still favorable for building and there is an urgent demand for prompt shipment to enable contractors to complete their work before severe winter weather sets in.

The demand for both black and galvanized sheets has improved and although announced quotations have not been changed, concessions are not so freely made and sales are frequently effected at an advance of $1.00 above recent quotations.

Manufacturers of agricultural implements report tremendous demand for their products and they are specifying freely on contracts. The demand for nails and barb wire fencing is active and there is abundant evidence of the prosperity of farmers.

Complaints of car shortage are more frequent, showing the great difficulty the railroads are experiencing in meeting the demands of the shippers. In the Pittsburg district many thousands of tons of finished materials are waiting cars, and one large interest has found it impossible for some time to obtain any cars with which to handle its scrap.

Although several large interests have not yet announced their prices on ore for 1906 delivery, some contracts have been made at an advance of 50 cents per ton over the quotations of this year, and it now seems probable that this will be the prevailing rate. Never in the history of the lake trade have lake freight rates on ore been so regular. From the opening of navigation to the present time rates have been based on 75 cents from the head of the lakes, and all the large shippers are refusing to pay more. As an unusually heavy tonnage of ore was provided for by contracts with the vessel men, shippers have been able to prevent an advance on rates on wild ore.

There is still a pronounced shortage of coke, owing to a scarcity of cars and freight blockades. It is doubtful whether this condition will be improved, as the difficulties of delivery usually increase as the cold weather sets in.

THE WEEK IN IRON CENTERS.

PITTSBURG.

Inquires for Plates for Lake Vessels.—Market Strong With Tendency Upwards.

OFFICE OF *The Iron Trade Review*,
521 PARK BUILDING, November 14.

The market is strong in every branch and there has been an increasing tendency toward advance in pig iron, although the furnaces deprecate the conditions which, they say, show an inclination toward a runaway market with the attendant after results, when buyers simply cover for actual requirements after present supplies on hand have been exhausted. There has been comparatively little buying during the week.

Southern pig iron is quoted at $14 to $14.50, Birmingham and Virginia iron at $16 to $16.50 on the regular No. 2 grade. The sharp advance in ferro-manganese came as a suprise, prices going to $75 a ton, an advance of $10 within to days. A still further advance is expected.

An advance in sheets is reported, but the figures have not yet reached the trade. When it comes the advance will probably be about $2 a ton. The steel car companies are drawing heavily for plates and are operating to capacity and this market is in excellent condition despite the inability of mills to give anything like prompt delivery. The lake shipyards have made inquiries for prices on about 20,000 tons of plates. On structural material the demand continues heavy and specifications are coming in freely as are new contracts.

There is a difference of opinion as to the car shortage, this being felt more in some directions than in others. With the coming of winter the difficulties of the railroads will increase, and this will, to a large extent, hinder shipments. The new equipment and additional trackage of the Pennsylvania Railroad have placed that system in good shape, and it is having but little trouble handling shipments, but other roads are not so fortunate.

PIG IRON.—With dealers predicting $20 pig iron before January 1, and some furnaces not quoting at all, either for prompt delivery or first quarter, but little business has been done, and Bessemer is quoted at $17.50 to $18, valley. Iron is scarce and consumers seem to have covered ahead to the first of the year, and the inquiry is now mostly for first quarter iron. While deploring the tendency of prices to advance, there has been no indication on the part of those who have it to sell to let it go at the present market. We quote as follows:

Bessemer, Valley	$17.50 to $18.00
Bessemer, Pittsburg	18.35 to 18.85
No. 1 Foundry, Pittsburg	18.35 to 18.60
No. 2 Foundry, Pittsburg	17.85 to 18.10
Gray Forge, Pittsburg	16.85 to 17.35
Basic, Valley	17.25 to 17.75
Basic, Pittsburg	10.10 to 18.60

FERRO-MANGANESE.—Ferro-manganese is a very scarce article and sales have been made at $75, delivered Pittsburg, on two fair-sized orders. The leading interest purchased a considerable quantity and cleaned up on the $65 ferro. It is predicted freely that $90 mark will be reached within the next two weeks.

BILLETS.—The market for what few occasional sales have been made is nominally unchanged, $26 for Bessemer billets and $27 to $28 for open hearth. Sheet bars are still nominally $27.

MUCK BAR.—All quotations by producers in this district have been withdrawn during the week as they have no muck bar to sell at any price. As is usual on such occasions, eastern producers will get into the market and they are now quoting $30.50, delivered in Pittsburg. The quotation last week as $28.50.

SKELP.—An advance in prices is noted this week. We quote:

Bessemer steel, grooved, 1.65c to 1.70c; sheared, 1.70c; open hearth, grooved, 1.65c; sheared, 1.75c; iron, grooved, 1.70c; sheared, 1.75c to 1.80c.

RAILS AND TRACK MATERIAL.—While the heavy buying movement seems to have taken a lull, the Harriman lines are still buying freely and during the week closed for about 25,000 tons, standard sections. The mills are now booked so far ahead that delivery is uncertain. The activity in light sections is as strong as ever and mills are running to capacity. We quote prices on regular delivery unchanged, as follows, premiums being paid in some instances to obtain early delivery of light rails:

Fifty pounds and heavier, 500-ton lots and over, $28; carload lots and less than $500 tons, $30; less than carload lots, $32; light rails, 16-lb., $29 to $30; 20-lb., $27.50 to $28; 25 to 45-lb., $26; angle bars for standard sections, 1.50c; spikes, $1.90 to $1.95.

PLATES.—There has been no falling off in the contracts for this material and mills are unable to keep up with the requirements of purchasers, although the steel car companies, who are very heavy consumers, have been given enough to keep them going. The steel car companies are still figuring on new contracts and lake shipyards have asked for prices on between 20,000 and 25,000 tons of plates, and it is reported they are now figuring on about twelve new lake freighters, although the yards of the American Shipbuilding Company are now full and every berth taken until next June. With the additional work which their plate inquiries suggest, lake yards would be filled until the close of navigation next fall. We quote, unchanged, as follows:

Tank plate, ¼ in. thick, 6¼ in. to 100 in., 1.60c. f. o. b. mill Pittsburg. Extras are as follows per 100 lb.: Flange and boiler steel, 10c; marine, A. B. M. A. and ordinary fire box, 20c; still bottom, 30c; locomotive fire box, 50c; plates over 100 in. up to 110 in. in width, not less than 5c extra; plates 110 in. to 115 in. wide, not less than 10c extra; 115 to 120 in., not less than 15c extra; plates 120 in. to 125 in. wide, not less than 25c extra; plates, 125 in. to 130 in., not less than 50c extra; plates, 130 in. wide, not less than $1 extra; plates 3-16 in. thick, 10c extra; gauges 7 and 8, 15c extra; No. 9, 25c extra. Five cents extra for less than carloads. Terms net cash in 30 days, and for all points of delivery in the United States except Pacific Coast.

MERCHANT BARS.—Specifications for merchant bars continue heavy with prices unchanged. The bi-monthly settlement of the bar iron scale at Youngstown with the Republic Iron & Steel Company, after an examination of the sales sheets determined that the puddlers and finishers would, during the next 60 days, receive the same as during the same period back. Based on the healthy condition an advance was confidently expected, but when the settlement was made on a basis on 1.4 it became known that the business done was on old orders. We quote:

Common iron bars, 1.80c, Youngstown; 1.85c Pittsburg; hoops, 1.75c, and bands, 1.50c; taking hoop and band extras, respectively. Bessemer steel bars, 1.50c; open-hearth steel bars, 1.50c; plow and cultivator, 1.50c, net; channels, angles, zees and tees under 3 in., 1.60c, all f. o. b. Pittsburg. The following differentials are maintained on steel: Less than 2,000 lb., 10c advance; less than 1,000 lb. of a size, 30c advance.

STRUCTURAL MATERIAL.—Specifications are being received freely and the tonnage continues to be heavy despite the inability to give anything like prompt delivery. Orders

for structural steel to be used before the cold weather sets in have fallen off and the premiums which were secured by some mills are no longer obtained. Regular mill prices are unchanged as follows:

Beams and channels, 15 in. and under, 1.70c; over 15 in., 1.80c; zees, 1.70c; tees, 1.75c; angles, from 3 to 8 in., inclusive, 1.70c; universal and sheared plate 6¼ in. and wider, 1.60c, base.

PIPES AND TUBES.—The demand still continues good for merchant pipe and considerable pipe line business is being done. We quote in car lots to consumers as follows, prices to large jobbers being one point lower:

	Steel		Iron	
Consumers' Carloads	Black	Galv.	Black	Galv.
⅛ and ¼ inch	71	55	68½	52½
⅜ and ½ inch	75	63	72½	60½
¾ to 6 inches	79	69	77	67
7 to 12 inches	74	59	72	56½
EXTRA STRONG PLAIN ENDS.				
⅛ to ¼ inch	64	52	61½	49½
⅜ to 4 inches	71	59	68½	56½
4½ to 8 inches	67	55	64½	52½
Double extra strong plain ends, ½ to 8 inches	60	49	75½	49½

MERCHANT BOILER TUBES, CARLOADS, 22 FEET AND UNDER.

	Steel	Iron
1 to 1½ inches	44	41
1¾ to 2¼ inches	56	41
2½ inches	58	46
2¾ to 5 inches	64	53
6 to 13 inches	56	41

Less than carloads, two points less.
2½ inches and smaller, over 18 feet, 10 percent net extra.
2¾ inches and larger, over 22 feet, 10 percent net extra.

SHEETS.—A report of an advance in the price of sheets has been freely circulated, although it has not reached the trade. As this advance has been expected, there will be no surprise and will not be on the official list price, which remains nominally at 2.40c for black and 3.45c for galvanized, No. 28 gauge, the advance being in the lesser rebates.

We quote the official prices as follows, these being quite nominal, but well representing the differentials between gauges:

No. 30, 2.65c; No. 29, 2.55c; No. 28, 2.40c; No. 27, 2.30c; Nos. 25-26, 2.25c; Nos. 22-24, 2.20c; Nos. 17-21, 2.15c; Nos. 15-16, 2.10c; Nos. 13-14, 2.05c; Nos. 10-12, 2c. Galvanized, Nos. 10-11, 2.35c; Nos. 12-14, 2.45c; Nos. 15-16, 2.55c; Nos. 17-21, 2.70c; Nos. 22-24, 2.85c; Nos. 25-26, 3.05c; No. 27, 3.25c; No. 28, 3.45c; No. 29, 3.70c; No. 30, 3.95c. Quotations f. o. b. Pittsburg, 30 days net, 2 per cent. off cash 10 days.

WIRE AND WIRE NAILS.—The market is in good condition, jobbers are specifying freely and the mills are turning out a big tonnage, and there is practically no shading in prices. We quote as follows:

Wire nails, jobbers' carload lots, $1.80; retailers' carload lots, $1.85, and less than carloads, $1.95; painted barb wire, $1.95 for jobbers in carloads; retailers' carloads, $2, and less than carloads, $2.10, with 30c for galvanizing. Annealed smooth fence wire is held at $1.65, with the usual differentials to retailers for carloads and less than carloads. Quotations are all f. o. b. Pittsburg, 60 days, with 2 per cent. discount for cash in 10 days. Iron and steel cut nails, $1.70 to $1.75.

MERCHANT STEEL.—Producers are well sold up for several months ahead, new business is coming in at a satisfactory rate and specifications on old contracts are good. We continue to quote as follows:

Cold rolled and ground shafting, 50 per cent. off in carload lots, and 45 off in less than carloads, delivered in base territory; tire steel, 1.70c; open-hearth spring steel, 2.25c to 2.50c; sleigh shoe flat, 1.50c to 1.55c; smooth finished machinery steel, 1.70c to 1.75c; toe calk, 2c to 2.05c.

OLD MATERIAL.—Dealers are coming in a little more freely than they have for some time past and the market continues very firm and considerable business is being done. Mills have, apparently, begun to appreciate they will have to pay the prices for which the dealers are holding if they want the scrap, and this accounts in a large measure for the improvement. Quite a few exchange deals have also been reported. We quote as follows, gross tons, delivered, Pittsburg district:

Heavy melting stock, $17.25 to $17.75; old steel rails, long lengths, $17.50 to $18; No. 1 cast scrap, $16; cast iron borings, $10.50 to $11, the latter for heavy borings; bundled sheet scrap, $14.75 to $15.25; No. 1 wrought scrap, $20.50 to $21; low phosphorous scrap, $20 to $21.

COKE.—Some producers of Connellsville 72-hour foundry coke are asking $4 for spot delivery and $3.50 for first half and the whole of next year, while others are not quoting at all for either prompt or next year delivery, and only taking care of their old customers at the market. Furnace coke is quoted at $3 on contract and $3.05 to $3.10 for prompt.

CHICAGO.

Prospects of Scarcity of Pig Iron—Rush of Belated Buyers.

OFFICE OF *The Iron Trade Review*,
1164 MONADNOCK BLOCK, November 14.

There was notable activity in pig iron last week and further advances have been made. The local product is selling from $19 to $20 Chicago for No. 2 foundry, and Southern irons at $18.15 for the same grade. Birmingham furnaces are now on a level with Virginia producers in this market, the latter still maintaining their schedule based on $15.50 furnace for No. 2. Trading last week was of a character to justify the impression that the market had broken away from all restraint. Many belated buyers came out with wants ranging from 10,000 tons downwards, and their eagerness to place same created all the symptoms of a boom. If the reports of sellers regarding the condition of their several furnaces are all true, there will be a marked scarcity of iron before the end of the first half. The northern situation is especially acute, several stacks having entirely withdrawn from the market. Charcoal, malleable and basic irons, as well as foundry grades, have advanced according to the relative scarcity and demand for each. In finished material there is no appreciable change. Though sheets are weak and continue to be sold on the basis of $2.20 Pittsburg for No. 28 gauge black, there is a better demand than formerly. Some irregularity has developed in wire products, several independent makers selling retailers on the same basis as jobbers. The consumption of merchant pipe is of encouraging volume, the open weather that has prevailed permitting the continuance of outdoor operations for a longer period than usual. Specifications for plates, structural steel, bars and rails are very heavy, all the mills suffering from a congestion of same. Bar iron is firm at $1.85 Chicago. The demand for this product is brisk, especially from railroads, one inquiry from this source being for 8,500 tons. Scrap has recovered from the setback it received a few weeks ago, and is now selling freely and at higher prices than before. Coke has also advanced, Connellsville foundry grades being quoted at $6.65 to $6.90, and Wise County brands $6.25 to $6.50.

PIG IRON.—There was another rush of belated buyers last week covering for requirements in the first half. At times the movement took on the appearance of a boom, and under the pressure of demand prices again moved to higher levels. Alabama irons are now selling on the basis of $14.50 Birmingham for No. 2 foundry, which is an advance of $1 in the space of two weeks. Northern irons are firm at $19.00 to $20 for No. 2, and are difficult to obtain at these prices. Virginia irons are without change, the leading interests quoting $15.50 furnace for No. 2, though there is a growing tendency on the part of isolated furnaces to advance this price. The scarcity

of Lake irons is the strongest feature of the local situation. Several furances have withdrawn from the market; others are extremely reluctant about taking on additional tonnage and are selling only to most favored customers. Malleable iron is especially scarce, and is strong at $19.50 to $20. Lake Superior charcoal is firm at $20 Chicago. High silicon irons are hard to obtain, and a week ago Kentucky and Ohio brands were advanced $1 a ton. The Southern market received additional strength by the report that another effort is being made to effect the merger of Birmingham furnaces which failed several months ago. The revival of this rumor brought out a large tonnage of wants. Three transactions involved 17,000 tons of basic; another 10,000 tons of foundry and silvery irons; while there were many other lots ranging from 5,000 tons downward. We have revised our prices, and quote as follows:

Lake Superior charcoal	$19.50 to 20.00
Northern Foundry No. 1	20.00 to 21.00
Northern Foundry No. 2	19.00 to 20.00
Northern Foundry No. 3	18.00 to 19.00
Northern Scotch Foundry	20.00 to 21.00
Ohio Strong Softeners No. 1	19.30 to 19.80
Ohio Strong Softeners No. 2	18.80 to 19.30
Southern Foundry No. 1	18.65 to 19.15
Southern Foundry No. 2	18.15 to 18.65
Southern Foundry No. 3	17.65 to 18.15
Southern Foundry No. 4	17.40 to 17.90
Southern No. 1 Soft	18.65 to 19.15
Southern No. 2 Soft	18.15 to 18.65
Southern Gray Forge	16.15 to 16.40
Southern Mottled	15.65 to 16.15
Southern Silveries (4 per cent to 6 per cent Silicon)	18.65 to 19.15
Jackson Co. Silveries....6%, 18.80; 8%, 20.80; 10%	22.30
Alabama and Georgia Car Wheel	21.15
Malleable Bessemer	19.50 to 20.00
Basic Iron	18.65 to 18.90

BILLETS—There is a steady demand for forging billets. Prices are firm at $33 to $35 for carload lots. Wire rods are unchanged at $33 Pittsburg, and $35 for chain rods.

BARS.—There is a heavy demand for both iron and steel bars. Deliveries of the latter cannot be given in less than two to three months and when less than this period is demanded stiff premiums are asked. Specifications are extremely heavy from implement makers, who are taking all the material they can get and placing it in storage. Bar iron is in equally as strong a position as its sister product. Inquiry from railroads is very heavy, ranging from 8,500 tons for the Illinois Central to carload lots. Some makers are declining to take on further tonnage except from their regular customers, and frequently these are not sold the full amount of their order. Prices have advanced 50 cents a ton, the range now being 1.85c to 1.90c. We quote carload lots, mill shipments, Chicago delivery, as follows: Soft steel bars and bands, 1.66½c, half extras; soft steel angles, less than 3x3, 1.76½c; hoops, 1.91½c base, full extras; hard steel angles, 1.60c to 1.65c. Demand from store is heavy and prices are firm. We quote bar iron, 1.95c to 2c base, full extras; soft steel bars and bands, 1.85c base, half extras; soft steel angles, channels and tees, under 3 in., 1.95c; hoops, 2.20c to 2.30c base, full extras.

SHEETS.—Demand for both black and galvanized sheets has improved in the last week. The inquiry is general, coming from all classes of consumers in all sections of the country. Many are protecting their wants as far ahead as the mills will permit while prices are low, though the leading sellers decline to sell beyond the first quarter. It is still possible to buy on the basis of $2.20 Pittsburg for No. 28 gauge black, and from $3.25 to $3.30 Pittsburg for galvanized. Local mills and jobbers, however, are maintaining a minimum, which is $1 higher than these prices. We quote mill shipments, Chicago delivery, as follows:

Blue annealed sheets, Nos. 9 and 10, 1.76½c to 1.81½c; Nos. 11 and 12, 1.81½c to 1.86½c; Nos. 13 and 14, 1.86½c to 1.91½c; Nos. 15 and 16, 1.96½c to 2.01½c. On box annealed, one pass, cold rolled, we quote: Nos. 18 and 20, 2.16½c to 2.21½c; Nos. 22 and 24, 2.21½c to 2.26½c; Nos. 25 and 26, 2.26½c to 2.31½c; No. 27, 2.31½c to 2.36½c; No. 28, 2.41½c to 2.46½c; No. 29, 2.51½c to 2.56½c. We quote on lots from warehouse stocks as follows: No. 10, 2.15c to 2.20c; No. 12, 2.20c to 2.25c; No. 14, 2.25c to 2.30c; No. 16, 2.35c to 2.40c; Nos. 18 and 20, 2.50c to 2.55c; Nos. 22 and 24, 2.55c to 2.60c; No. 26, 2.60c to 2.70c; No. 27, 2.75c to 2.80c; No. 28, 2.85c to 2.90c; No. 29, 3c to 3.05c. Galvanized sheets, mill shipments, Chicago delivery, are quoted as follows: Nos. 12 and 14, 2.36½c to 2.41½c; No. 16, 2.51½c to 2.56½c; Nos. 18 and 20, 2.66½c to 2.71½c; Nos. 22 and 24, 2.81½c to 2.86½c; No. 26, 3.01½c to 3.06½c; No. 27, 3.21½c to 3.26½c; No. 28, 3.41½c to 3.46½c; No. 29, 3.66½c to 3.71½c. Jobbers' prices on small lots from store are as follows: Nos. 10 to 14, inclusive, 3.10c; No. 16, 3c; Nos. 18 and 20, 3.10c; Nos. 22 and 24, 3.25c; No. 26, 3.50c; No. 27, 3.70c; No. 28, 3.05c; No. 29, 4.40c; No. 30, 4.85c.

STRUCTURAL STEEL.—New business was light last week because the mills cannot longer guarantee deliveries within two to three months. Specifications, however, are to the full capacity of all plants. The offers of premiums to independent makers and jobbers for quick shipments are very numerous, and fears are expressed that this insistency will force an advance in prices. The new structural mill at South Chicago was placed in operation on the first of the month and is running on 6-in. angles. No new business has been taken for this plant, and the entire output for some time will be applied on Carnegie contracts. Construction work in Chicago is very active as a result of the open weather, and local jobbers have difficulty in keeping their stocks replenished. Prices are without change. We quote carload lots, mill shipments, Chicago delivery, as follows:

Beams and channels, 3 to 15 in., inclusive, 1.86½c; angles, 3 to 6 in., 1.86½c; angles larger than 6 in., on one or both legs, 1.96½c; beams larger than 15 in., 1.96½c; zees 3 in. and over, 1.86½c; tees 3 in. and over, 1.91½c; with the usual extras for cutting to exact lengths, punching, coping, bending or other shop work. We quote prices from store as follows: Angles, 2.25c to 2.35c; beams and channels, base sizes, 2.25c to 2.75c; tees and zees, 2.30c to 2.35c. These prices are for either random lengths or cut to specifications in excess of 5 ft.

PLATES.—The local mill has received the contract for the material for a new freighter which was placed with the shipbuilder a week or ten days ago. About 4,000 tons of steel will be required, the structural shapes going to Pittsburg and the plates to South Chicago. Corporation mills are laboring under a great stress of business, with specifications on hand to run their plants for several months if not another ton is taken. Prices are without change, and we quote mill shipments, Chicago delivery: Tank steel, ¼ in. and heavier, up to 100 in. wide, 1.76½c base; flange steel, 1.86½c base; marine steel, 1.96½c base, all full extras. Plates, 3-16 in. thick, $2 extra; gauges 7 to 8, $3 extra; No. 9, $5 extra. Less than carload lots, $5 extra. Jobbers report a good movement from local stocks, with store prices firm. We quote on small lots as follows: Tank steel, ¼ in. and heavier, up to and including 72 in. wide, 2c to 2.10c; over 72 in. wide up to 100 in., 2.10c to 2.20c; over 100 in. wide, usual mill extras; 3-16 in. up to but not including 72 in. wide, 2.10c; 3-16 in., 72 in. wide, 2.35c; flange steel, 25c extra; heads, 25c extra.

RAILS AND TRACK SUPPLIES.—In a small way, electrical railroads are buying freely of standard sections and track supplies. Much tonnage is withdrawn from the market because of the inability to get deliveries at the proper time. Trading in light rails is of excellent volume, and prices have advanced $1 a ton. Track bolts have also advanced $2 a ton. We quote heavy sections in 500-ton lots, f. o. b. mill, $28; less than 500 tons to car lots, $30; less than carload lots, $32. Light rails, f. o. b Milwaukee, mill: 12-lb. sections, $31; 16-lb., $30; 20-lb., $29; 25-lb., $28; 30, 35, 40

and 45-lb. sections, $26.50. Track supplies, f. o. b. Joliet, are as follows: Angle bars, 1.50c to 1.75c, according to tonnage; spikes, first quality, 1.85c to 1.95c; track bolts, 3¼x¾, with square nuts, $2.50 to $2.60 per 100 lbs.; with hexagon nuts, $2.65 to $2.80.

MERCHANT STEEL.—Implement makers are specifying freely on their contracts, and wherever possible are anticipating their requirements and placing the material in storage. All agricultural plants are experiencing a tremendous demand for their machinery, which has called for a supply of iron and steel greatly in excess of previous estimates. The result is that mills continue snowed under with business. Prices are firm. We quote carload lots, mill shipments, Chicago delivery, as follows: Spring steel, 2.10c; sleigh shoe, flat sizes, 1.71½c; concave and convex, 1.86½c; cutter shoe, 2.35c to 2.40c; smooth finished machinery steel, 1.91½c; smooth finished tire, 1.86½c; plow steel, 2.20c and upward, according to quality; toe calk steel, 2.21c; railway spring, 1.86½c. Cold rolled shafting, 50 and 2½c per cent off to dealers, 50 per cent off in carload lots, and 45 per cent in less than carload lots. Crucible tool steel, 6½c to 8c; special grades of tool steel, 13c and up.

CAST IRON PIPE.—No municipal lettings have been made since our last report. The active season is now past and trade is expected to be dull until next spring. Routine business is of good volume. Specifications are active and to the full capacity of plants. Prices are very firm and may be advanced at an early date. We quote carload lots, f. o. b. Chicago: 4 in. water pipe, $30; 6, 8, 10 and 12 in., $29; larger sizes, $28.50; gas pipe, $1 extra.

MERCHANT PIPE.—Current business continues to exceed the expectations of makers, keeping up to past proportions despite the colder weather. A large portion of the material goes into building construction, which is active throughout this district. Prices are firm on the basis of 78.35 per cent discount from list f. o. b. Chicago for ¾ to 6-in. black steel pipe, mill shipments. Local jobbers are asking 77 per cent discount for the same size for shipments from stock.

BOILER TUBES.—All the mills report an active demand, many being slow on deliveries. Jobbers are having some trouble keeping their stocks replenished and have to press makers for shipments. Railroad trade is especially brisk. Prices are firm and without change. We quote carload lots, Chicago delivery, as follows:

	Steel.	Iron.	Seamless.
1 to 1½ inches	40.35	37.35	53.00
1¾ to 2¼ inches	54.35	39.35	40.00
2½ inches	56.35	44.35	43.00
2¾ to 5 inches	62.35	51.35	
		Up to 4½ inches	50.50
6 to 13 inches	52.35	37.35	

Less than carload lots from store, as follows:

	Steel.	Iron.	Seamless Steel
1 to 1½ inches, inclusive	40	35	42½
1¾ to 2¼ inches, inclusive	50	85	35
2½ inches, inclusive	52½	35	30
2¾ to 5 inches, inclusive	60	47½	42½

WIRE PRODUCTS.—The demand for nails and barb wire fencing throughout the Southwest is very brisk, jobbers and dealers reporting their stocks are depleted almost as rapidly as they are replenished. Some irregularity has developed in prices, it having recently come to light that independent makers are selling to retailers on the same basis as to jobbers. The demand for smooth wire for manufacturing purposes is also heavy, the entire trade covering freely for their winter requirements. We quote carload lots, mill shipments, Chicago delivery, to jobbers, as follows: Wire nails, $1.95; painted barb wire, $2.10; galvanized barb wire, $2.40; smooth annealed wire, $1.80; smooth galvanized wire, $2.10; polished staples, $2.10; galvanized staples, $2.35. Carload lots to retailers, 5 cents higher than above prices; less than carload lots, 15 cents higher are quoted.

COKE.—Foundry cokes have sold freely in the week under review. Shipments from ovens continue light, owing to car shortages, etc., and prices in this market are of an upward tendency. Connellsville 72-hour brands are strong at $4 ovens, or $6.65 Chicago, though some sellers are asking $6.90. Wise County coke is selling at $4.25 ovens, or $6.50 Chicago. The lower freight rate to Chicago gives this product an advantage in this market over Connellsville brands, and as it is liked as well by many melters, it is constantly in good demand. The frequent interruption in the supply of Connellsville cokes by the scarcity of cars and freight blockades, etc., which is most keenly felt in the winter months, has turned the attention of Western foundrymen to the use of by-product cokes, of which several plants are in operation in the West; all that is offered by these interests is quickly taken up at prices on a par with Connellsville brands.

OLD MATERIAL.—Local mills show no inclination to buy scrap at the prices prevailing and remain passive observers of the situation. The market, however, has not weakened by this attitude, dealers having no trouble in disposing of their stocks among Eastern consumers. Railroads are unloading their piles of scrap and getting good prices for same. Last week nearly 6,000 tons emanated from this source; this week the supply is about 10,000 tons, the principal amounts being offered by the Illinois Central and Santa Fe. There is a large supply of dealers' forge or country wrought in local yards and some mills have purchased considerble tonnages of this grade as a substitute for railroad wrought. We have revised our quotations and our present prices are about 50 cents above those of a week ago. Gross tons are quoted as follows:

Old Steel Rails (4 feet and over)	$16.50 to 17.00
Old Steel Rails (less than 4 feet)	16.00 to 16.50
Old Iron Rails	23.00 to 23.50
Relaying Rails, subject to inspection	26.50 to 27.00
Heavy Melting Steel	15.00 to 15.50
Mixed Country Steel	12.50 to 13.00

For net tons we quote as follows:

No. 1 R. R. Wrought	$17.50 to 18.00
No. 2 R. R. Wrought	16.50 to 17.00
Shafting	18.00 to 18.50
Dealers' Forge No. 1	14.50 to 15.00
Wrought Pipe and Flues	12.50 to 13.00
No. 1 Cast, 150 lbs. and less	14.50 to 15.00
No. 1 Mill	9.50 to 10.00
No. 1 Busheling	12.50 to 13.00
No. 2 Busheling	12.25 to 12.75
Country Sheet	8.50 to 9.00
No. 1 Boilers Cut	12.50 to 13.00
Boiler Punchings	15.00 to 15.50
Iron Car Axles	23.50 to 24.00
Steel Car Axles	18.00 to 18.50
Iron Axle Turnings	11.50 to 12.00
Cast Borings	10.00 to 10.50
Mixed Borings, etc.	10.00 to 10.50
Machine Shop Turnings	11.75 to 12.25
Railroad Malleable	15.00 to 15.50
Agricultural Malleable	14.00 to 14.50
Stove Plate and Light Cast Scrap	12.00 to 12.50
Old Iron Splice bars	19.50 to 20.00

CINCINNATI.

Pipe Interests the Principal Purchasers—One Large Producer Advanced to $14.50.

Pig Iron.—Aside from the purchases of cast iron pipe interests, the buying of pig iron has not been heavy the past week. Pipe makers are reported to have taken on another round lot of iron and have bought both northern and southern makes. There has been a fair scattering demand for smaller tonnages of from 100 tons up to 500 tons and sales of southern iron were mainly at $14.00 Birmingham for No. 2, while northern iron has advanced and sales have been made at $17.50 to $18.00 for No. 2 foundry at southern Ohio furnaces. At the close of the week one of the large southern producers announced that its prices would be on the basis of $14.50 Birmingham, taking effect at once. There are fewer southern furnaces now in the list

of sellers than at any time in the recent past, and aside from the large interest that is on the $14.50 basis, most of the heavy producers are out of the market, or have only some special grades to offer. The Virginia furnaces are now only taking orders subject to furnace acceptance, and state that they are considering another advance in prices. The market is in such a sensitive condition that higher prices are looked for at any time. There are some lots of gray forge available at $12.50 to $13.00 for prompt shipment, but most of the spot iron has been taken and this feature of the market is decidedly stronger than it was three weeks ago. It is believed that a number of consumers have not fully covered their wants for the second quarter of next year and that a few will need iron in the first quarter. Furnace interests are not inclined to anticipate this demand however, and do not show a disposition to advance prices except as they are justified in doing so by the calls for iron by consumers. It is believed by conservative men in the trade that the heavy production of pig iron will be ample for the requirements, but that the requirements will be sufficiently large to support prices, with chances favoring a steadily advancing market for the near future. We quote f. o. b. Cincinnati as follows:

Southern Foundry No. 1	$17.25 to 17.75
Southern Foundry No. 2	16.75 to 17.25
Southern Foundry No. 3	16.25 to 16.75
Southern Foundry No. 4	15.75 to 16.25
Southern Foundry No. 1, soft	17.25 to 17.75
Southern Foundry No. 2, soft	16.75 to 17.25
Gray Forge	15.25 to 15.75
Northern Foundry No. 1	19.15 to 19.65
Northern Foundry No. 2	18.65 to 19.15
Northern Foundry No. 3	18.15 to 18.65
Jackson County Silvery, 8 percent	20.15 to 20.65
Southern Charcoal	19.75 to 20.25

Finished Material.—The demand continues good and the market firm at unchanged quotations. Bar iron is quoted at 1.70c to 1.75c; steel bars at 1.63c, half extras, with dealers quoting 1.85c for iron and steel out of store. Galvanized sheets No. 10 and No. 12, in car lots are 2.48c. We quote black sheets, No. 27, at 2.30c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 2.70c; No. 27, 2.60c; No., 16, 2.20c; No. 14, 2.10c; No. 12, 2c. Tank plates are firm and sell out of store at 2c for ¼-in. and 2.10c for 3-16, Nos. 8 and 10. Beams and channels are quoted at 2.25c to 2.50c from stock and angles at 2c to 2.05c for base sizes.

In merchant pipe there is a steadier tone, the independent mills are getting closer to the schedule of the leading interest and the demand is reported as good. We quote f. o. b. Cincinnati:

MERCHANT PIPE.

(Basing Discounts.)

	Steel Pipe. Black. Percent.	Steel Pipe. Galv. Percent.	Guaranteed Wrought Iron Pipe. Black. Percent.	Guaranteed Wrought Iron Pipe. Galv. Percent.
⅛ and ¼ inches	69.7	53.7	67.2	51.2
⅜ and ½ inches	73.7	61.7	71.2	59.2
¾ to 6 inches	77.7	67.7	75.7	65.7
7 to 12 inches	72.7	57.7	70.7	55.2

Coke.—There has been a little freer movement the past week, but the car supply at the ovens is still short. Prompt shipment coke has been offered a little more freely at slightly easier prices. We revise quotation. Prices in the various coke producing districts are as follows:

Old Material.—The demand is good and the market rules firm with an advancing tendency. We quote f. o. b. Cincinnati:

†Wise County, Va. Furnace Coke prompt shipment.	$ 2.65 to 2.75 per ton
Wise County, Va. Foundry Coke prompt shipment.	4.00 per ton
Pocahontas Furnace Coke on contracts	
Pocahontas Foundry Coke on contracts	
Connellsville Furnace Coke prompt shipment	2.75 to 3.00 per ton
Connellsville Foundry Coke prompt shipment	3.90 to 4.25 per ton
New River Foundry Coke on contracts or prompt ship't.	3.50 per ton
New River Furnace Coke, prompt shipment	2.50 per ton

†Wise County, Va., Coke on Furnace contracts is sold mainly on a sliding scale basis for pig iron prices on the following basis: $1.65 per ton on $9.00 pig iron, plus 17 percent of the advance on pig iron above $9.00 Birmingham.

NEW YORK.

Demand For Pig Iron Becoming Urgent—Heavy Values Continue.

(Special Telegram.)

New York, Nov. 14.—The premiums being paid for structural steel have not been reduced. The demand for small lots is urgent, a bonus of three cents a pound being paid for delivery before bad weather puts a stop to building.

Rail sales include twenty-five thousand tons each to the Union Pacific and the Boston & Maine, ten thousand tons to the Pacific & Idaho Northern, nine thousand tons for the Yosemite Valley, five thousand tons for trolley lines and several small lots of from two to four thousand tons for delivery this year.

Additional pig iron purchases include a lot of eleven hundred tons high silicon foundry by a steam pump works at Cambridge, Mass., and a few small lots of standard steel irons.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, NO 150 NASSAU ST., November 14.

Pig Iron.—The situation is about as strong as it could be. Consumers of all grades are clamoring for iron, and sales seem to be limited only by the ability or willingness to deliver. The foundries are all running to their fullest capacity, which in many cases has been greatly increased during the past few months. Hurry orders on old contracts are becoming increasingly common, and at least one melter will be obliged to suspend operations within a few days unless more material is forthcoming. Buyers are willing to accept contracts for delivery six months hence at the present ruling figures, but few producers are anxious to book so far ahead. In spite of the growing scarcity of supplies, sales have been of large volume. The largest transactions have been in low grade foundry and gray forge. The United States Cast Iron Pipe & Foundry Co. has been the heaviest purchaser, about 30,000 tons of its requirement having been placed with Buffalo and Virginia producers. Eaton, Cole & Burnham, of Bridgeport, Conn. placed two orders of 1,500 tons each, one for high silicon iron, and small purchases of foundry grades make up a considerable aggregate. Transactions in basic and malleable have been light owing to the scarcity of supplies. Northern furnaces are asking $17 and $17.50 at the furnace for foundry and basic, while in Virginia $16 for No. 2 is reported and one Alabama producer has advanced the price of the same grade at Birmingham to $14.50. Sellers are discouraging unnecessary purchases, and several large producers are sold up through June next.

The following are prices at tidewater:

Northern No. 1 Foundry	$18.00 to 18.75
No. 2 Foundry	17.75 to 18.50
No. 2 Plain	17.00 to 17.50
No. 1 Southern Foundry	18.00 to 18.75
No. 2 Southern Foundry	17.50 to 18.25
No. 3 Southern Foundry	17.25 to 18.00
No. 4 Foundry	17.00 to 17.25

Finished Iron and Steel.—Considering the immense amount of business in finished steel for 1906 already placed, the transactions of the week have been far from light. An aggregate of more than 75,000 tons of rails was sold for 1906 delivery. There have also been a number of small orders for delivery during the remainder of the year. Structural steel mills are rapidly catching up and premiums are becoming gradually less. Few actual sales were made, but a very large tonnage of material for railroad construction and buildings is still pending and is expected to be released within a few days. Talk of an advance in plates is again rife, but a local representaitve of the leading in-

dependent interest declares that such action is not at all warranted by the free demand. Bar iron has been strong, but sheets still lag far behind the heavier products in general activity. The following are prices at tidewater: Angles, 3 to 6 in. x ¼ in. and heavier. 1.84½c; beams, 3 to 15 in., 1.84½c; tees, 3 x ¼ in. and heavier, 1.89½c; plates, carloads, tank, 1.74½c; flange, 1.84½c; marine and ordinary fire box, 1.94½c; refined iron bars, 1.79½c; soft steel bars, 1.64½c to 1.79c; sheets in carload lots New York, black 2.40c.

Pig Iron Certificates.—Trading on the New York Produce Exchange has been fairly active and higher prices in sympathy with the pig iron market prevail. About 1,000 tons of warrants were sold on the basis of $14, Birmingham. A sale of 100 tons of the regular classification was effected for December delivery at $17.10 and a similar lot for March delivery at $17.15. A lot of 200 tons of No. 2 foundry, Alabama, for spot delivery was sold for $14 and other for delivery in March at $14.25. Foundry iron warrants follow:

	Bid.	Asked.
November	17.00	17.50
December	17.10	17.50
January	17.20	
February	17.45	18.00
March		17.75

Old Materials.—The market is more firm and the demand for all sorts of scrap iron has improved materially. Consumers no longer hesitate to buy and some sales are reported above current quotations. The demand for wrought shop scrap has been good, sales of 800 tons being reported. Early in the week a sale of 150 tons of yard wrought scrap was made. Heavy melting steel scrap is in good demand and sales aggregating 800 tons are reported in the local market. The following are prices, at tidewater approximately:

Old iron rails	$21.00 to 22.00
Old steel rails, long lengths	15.50 to 16.00
Old steel rails, short pieces	15.00 to 15.50
Relaying rails	23.00 to 24.00
Old car wheels	16.00 to 16.50
Old iron car axles	24.00 to 25.00
Old steel car axles	19.00 to 19.50
Heavy melting steel scrap	15.50 to 16.00
No. 1 railroad wrought scrap	20.00 to 21.00
Iron track scrap	18.50 to 19.00
Wrought pipe	14.00 to 15.00
Cast borings	10.00 to 10.25
Wrought turnings	14.50 to 15.50

CLEVELAND.

Remarkable Uniformity of Freight Rates on Lakes—Pig Iron is Very Firm.

OFFICE OF *The Iron Trade Review*,
BROWNING BUILDING, November 14.

Iron Ore.—Some sales for 1906 delivery have been made at an advance of 50 cents over quotations of 1905, but comparatively little buying has been done. One interest has disposed of a considerable part of its tonnage at 25 cents' advance.

All of the large shippers have steadily refused to pay more than the contract freight rate, based on 75 cents from the head of the lakes, for the carrying of ore. Although an occasional cargo has been shipped at $1.00, these rare cases have not established the rate, which remains the same as it was at the beginning of the season. Never in the history of the lakes has there been such uniformity throughout the season. On account of the contracts being for a much larger tonnage this year than ever before, the ore shippers have practically monopolized the business from the upper lake ports. Vessel men who might have carried grain at a rate equal to $1.50 to $1.60 on ore were tied up by contracts, so that they were kept busy on their ore at 75 cents. Some of the vessel men are still behind on their contract ore. The large shippers say that during the summer they could have forced the rate down to 60 cents on wild tonnage, but they did not attempt to do so, and now they are not willing to pay more than the contract rate. Owing to this fact and to unfavorable weather, it being extremely cold at the head of the lakes and storms being frequent, the shipments after Nov. 1 to the close of the season will probably not be equal to those of last year, 3,500,000 tons.

Pig Iron.—The market is very strong with prices still tending upward. As showing unusual conditions prevailing, a sale made in the Youngstown district may be cited. Foundry iron was purchased by a Youngstown melter at $17.90 delivered, shipment being made from a considerable distance, and the delivery extending into the first quarter of next year. Pig of all grades is extremely scarce for the remainder of this year, and the first quarter of next. In some cases furnaces are quoting $18.00 at the plants for the second quarter, but no sales at this figure are reported. Canadian furnaces are not able to meet the demand from that section and Canadian melters are inquiring for iron, both northern and southern, in the United States. Southern iron is strong at $14.00 for No. 2 Birmingham, and one large furnace interest has advanced to $14.50. We quote f. o. b. Cleveland as follows:

Bessemer	$18.35 to 18.85
No. 1 Foundry	18.50 to 19.00
No. 2 Foundry	17.85 to 18.35
No. 3 Foundry	17.00 to 17.25
No. 2 Southern	17.85 to 18.35
Gray Forge	16.50 to 17.00
Gray Forge, Southern	15.85 to 16.35
Lake Superior charcoal	18.50 to 19.00

Finished Material.—There is more complaint about car shortage, and mills find it more and more difficult to give prompt shipment. The demand for sheets has improved and low quotations recently made are not now heard of. Bar iron is strong and the leading manufacturer in the Youngstown district has advanced quotations to 1.85c at the mill. Jobbers are doing excellent business with demand strong for nearly all kinds of material.

Old Materials.—The situation is much stronger. Mills are coming into the market with inquiries for good tonnages and as a result prices are crowding the higher figure of quotations. Old iron rails have advanced. Heavy melting steel is extremely firm; the available supply is limited and the filling of any large requirements will force a sharp advance. Small lots are selling within the figures given.

Old iron rails	$ 24.00 to 25.00
Old steel rails (over 6 feet)	16.00 to 17.00
Old steel rails (under 6 feet)	17.00 to 18.00
Old car wheels	16.00 to 16.50
Steel boiler plates	13.50 to 14.50
Steel axles	20.00 to 21.00
Malleable iron (railroad)	16.00 to 17.00
Malleable iron (agricultural)	15.00 to 16.00
Heavy steel	16.50 to 16.75

We quote as follows, net tons:

No. 1 R. R wrought	17.50 to 18.00
No. 1 busheling	14.50 to 15.50
No. 1 machine cast	14.00 to 14.50
Iron axles	23.00 to 24.00
Axle turnings	11.50 to 12.50
Wrought turnings (free from cast)	11.00 to 12.00
Grate bars	9.00 to 9.50
Pipes and flues	13.00 to 14.00
Tank iron	11.50 to 12.00
Hoop and band iron	8.00 to 9.00
Sheet iron	7.00 to 8.00
Wrought drillings	11.00 to 12.00
Stove plate	11.00 to 11.50
Cast borings	8.50 to 9.50

PHILADELPHIA.

Market Is Rather Quiet, But Pig Iron Prices Continue to Advance.

Pig Iron.—The market is more quiet than it was a few weeks ago, but there is apparently little diminution in demand, for under the pressure of orders, prices continue to rise steadily. Producers feel that they have done everything in their power to prevent a runaway market, and if buyers will insist upon placing big orders, they

must pay well for their iron. No. 2 X Foundry, which was quoted last week at $18.25, is now up to $18.50, and even $18.75 is said to have been paid by some persistent buyers. Other grades have gone up proportionately, and no one doubts that before the end of the year still higher prices will prevail. Coke seems to be in better supply. The prices given below represent the quotations of the standard brands of well established firms. Some small lots might be picked up here and there at slight concessions, but a fair average would be about as follows:

No 1X Foundry	$19.00 to 19.25
No. 2X Foundry	18.50 to 18.75
No. 2 Plain	18.00 to 18.25
Standard Gray Forge	16.50 to 16.75
Basic	17 75 to 18.25
Low Phosphorus	23.00 to 24.00
Southern No. 2X, rail	18.00 to 18.25
Southern No. 2X, dock	17 50 to 17.75

Finished Material.—Bar iron, which has rather lagged behind other finished products, is now feeling the effect of the great rush, and is quoted at 1.85 Pittsburg. There seems to be no cessation in the general activity, but prices remain at the normal figures given. In view of the steady advance in the price of pig iron it is the general expectation that a new schedule will soon be demanded. In the meantime prices remain as previously quoted: Beams, channels and angles, according to specifications, 1.82½c to 2.50c; refined iron bars 1.63½c to 1.80c; steel bars, 1.63½c to 1.83c; plates, 1.73½c to 1.80c.

BIRMINGHAM.

Birmingham, Ala., November 13.—There is but little, if any, spot iron to be obtained in the Birmingham district; that is, the furnace companies are unable to deliver quickly any large quantity of iron. The iron to be obtained within the next six weeks is not very extensive either. Iron quotations, delivery next year any time, are going up, No. 2 foundry now being quoted at $14 and $14.50 per ton. The last named price is being asked for all iron to be delivered between now and the first of March. Some iron has been sold at $14 per ton, No. 2 foundry basis, delivery during the first half of the coming year. Shipments of iron from the Birmingham district continue steady and the aggregate amount moving out is quite large, in fact it is easily to be seen that the outward movement is greater than the production.

The following quotations for pig iron are given in this district: No. 1, foundry, $14.50 to $15.00; No. 2, foundry, $14.00 to $14.50; No. 3, foundry, $13 to $13.50; No. 4, foundry, $13; gray forge, $12.50 to $13; No. 1, soft, $14.50 to $15.00; No. 2, soft, $14 to $14.50.

Announcement is made that New Orleans, La. parties will erect a large foundry and machine shop at East Birmingham. The site has been purchased from T. W. Aldrich 24 acres, of land having been bought for $30,000. It is understood that the plant will be equal to any in the district and that special efforts will be made for the manufacture of sugar machinery.

The Citizens' Industrial Association is holding its third annual convention in St. Louis this week. The meeting convened Wednesday, Nov. 15. This organization was formed in Chicago four years ago to establish in all manufacturing plants the open shop. Among those who will speak are Judge Jesse Holdom of Chicago, who has chosen for his text "History and Progress of Labor Unions." Other Chicagoans on the program are Secretary F. W. Job of the Chicago Employers' Association, who is to discuss "The Open Shop in Chicago and the Teamsters' Strike." Professor J. Lawrence Laughlin of the University of Chicago will speak on "Modern Industrialism." Chicagoans who are going as delegates include J. A. Barkley, William Webster of the Webster Manufacturing Company, John M. Stiles, Elliott Durand, George P. Bent, Edward F. Hamm, Commissioner of the Chicago Typothetae, Paul Blatchford, secretary of the Chicago Metal Trades Association, and P. D. Francis.

The Metal Market.

NEW YORK.

New York.—The local market is firm, but during the past week the buying by home consumers was not heavy. A temporary reaction occured in London but the recovery sent prices above all figures. Today's quotations follow. Spot 33.25 to 33.45; November 33.15 to 33.35; December 33.10 to 33.35; London £151 15d, £151 5s. Arrivals for the month to date, 830; afloat 2,865 tons.

Copper.—The situation is unchanged and prices rule firm. Both domestic and foreign consumers have bought fairly large amounts but stocks continue to accumulate. Today's closings follow: Lake and electrolytic, 16⅜c to 16⅝c; casting, 16⅛c to 16⅜c. London's closing today: £74 5s and £72 5s. Exports for the month to date, 4,634 tons.

Lead.—Pig lead has been scarce, strong and higher for all grades. Advances noted in other centers have had a prompt effect here. Today's closings: 5.25c to 5.50c; St. Louis, 5.22½c; London, £15 5s.

Spelter.—Refined spelter was easier for several days but it recovered and closed steady. Today's closings follow: Spot, 6.10c to 6.20c; St. Louis 6c; London, £28 10s.

Antimony.—Antimony is a shade easier. Today's quotations follow: Cookson's 12¼c to 12¾c; Hallett's, 12c to 12½c; Japanese, 11¾c to 12c; other grades 11¼c to 11¾c.

CHICAGO.

Office of the Iron Trade Review,
1164 Monadnock Block, Nov. 14.

Demand for metal is strong, local buyers covering freely for winter requirements. There is little change in quotations; lead is stronger as a result of the scarcity and tin is slightly higher. Spelter is inclined to weakness. We quote Lake copper in carload lots, 16½c to 16¾c and in smaller quantities 17¼c to 17¾c. Casting copper is 16c to 16½c for carloads and 16¾c to 17¼c for less than carload lots. Tin is quoted at 33½c to 34c for carload lots. Spelter, 6.05c to 6.10c for carloads, and 7c to 7¼c for lesser lots. Pig lead is 5c for 50-ton lots, and 5½c to 6c for smaller quantities, with spot selling as high as 5.40c. Antimony, 15c for Hallet's and 16c for Cookson's. Nickel 50c to 60c, according to amount and deliveries.

Old metals are selling freely and at prices in sympathy with scrap iron and steel. Dealers selling prices are approximately as follows: Copper wire 14.50c to 14.75c; copper, heavy, 14.50c; light copper, 13.50c; red brass, 13.65c; red brass borings, 11.50c; tea lead, 14.15c; zinc, 4.50c; pewter, 22c.

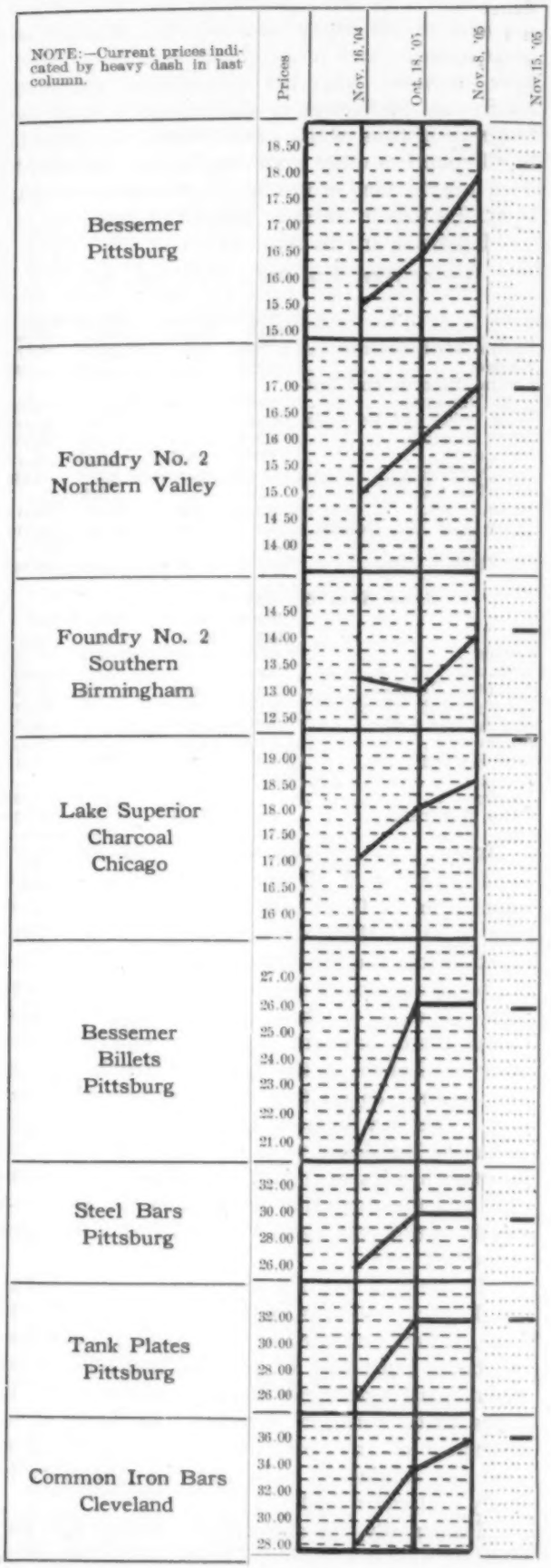
MACHINERY FOR NAVY YARDS.

(Special Correspondence.)

WASHINGTON, D. C., Nov. 11.—Among the bids opened this week by the bureau of supplies and accounts, navy department, were a number covering shell reamers and twist drills. The bidders on these items follow together with their proposals on Class 101, perhaps the most important in the schedule:

Manhattan Supply Co., New York	$2,496.57
Baird Machinery Co., Pittsburg	2,068.75
Coggins & Owens, Baltimore	2,091.98
The Fairbanks Co., New York	2,125.59
J. H. Leonard, New York	2,146.08
Montgomery & Co., New York	2,022.02
C. S. Mersick & Co., New Haven, Conn.	2,127.53
Philadelphia General Supply Co.	2,146.08
Rudolph & West Co., Washington, D. C.	2,097.25

PRICE CHART.



CLOSER AFFILIATION.

With National Metal Trades Association Considered at National Founders' Convention.

(Special Telegram.)

New York, November 15.—Prior to the opening of the ninth annual convention of the National Founders' Association at the new Astor Hotel in this city today, the Administrative Council held sessions Monday and Tuesday, discussing many matters of interest. The work of the council in considering the reports of the present officers was closed preliminary to the election of a new list of officers. The position of the Philadelphia foundrymen in the pending strike was warmly endorsed and the support of the association was pledged. About six hundred men are involved in the strike.

Forty members were present at the alumni dinner and the greatest enthusiasm was manifested. The work of the retiring council was commended. Discussion of the proposition to secure a closer affiliation of the National Founders' Association and the National Metal Trades Association was begun at the opening session of the convention Wednesday with the prospect that after an exhaustive consideration some action along this line would be taken. The meeting opened with a good attendance.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

The fifty-second meeting of the American Society of Mechanical Engineers will be held in New York city during the first week in December. The headquarters instead of being at the Society House, 12 West 31st street, as in previous years, will be at the Edison building, 44 West 27th street, the two upper floors being used.

The opening session at which President John R. Freeman will present the annual address will be at 44 West 27th street, Tuesday evening, Dec. 5.

The second or business session will be held Wednesday morning in the main saloon of the steamship Amerika at the docks of the Hamburg-American Line at Hoboken, N. J. Following this session a special train will take those desiring to make the excursion to the new Henry R. Worthington Hydraulic Works at Harrison, N. J. Wednesday evening there will be an illustrated lecture at 44 West 27th street, by Prof. R. W. Wood, of Johns Hopkins University, on "Photography of Invisible Phenomena."

The third session will be on Thursday morning at 44 West 27th street and besides the presentation of professional papers there will be a discussion on "Bearings." Thursday afternoon there will be reception at the New York School of Automobile Engineers, 146 West 56th street. The usual reception at Sherry's will be held Thursday evening.

The closing session will be at 44 West 27th street, Friday morning and will be devoted to the presentation of professional papers.

New England Foundrymen's Association.

The regular monthly meeting of the New England Foundrymen's Association was held at the Exchange Club, Boston, Wednesday, Nov. 8, at 5 P. M. Dinner was served at six o'clock, after which the routine business was disposed of in the usual manner, President John Magee presiding.

Applications were received from North & Judd Mfg. Co., New Britain, Conn., and Yale & Towne Mfg. Co., Stamford, Conn., and they were unanimously elected to membership.

The Chairman then introduced as the speaker of the evening, E. V. French, of The Associated Factory Mutual Fire Insurance Co., Boston, who spoke on: "Fire Protection Engineering with Special Reference to Foundries."

THE IRON TRADE REVIEW

Devoted to Iron and Steel Manufacture and to the Machinery, Metal-Working and Foundry Trades.

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NOVEMBER 16, 1905

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PROGRESS OF THE STRIKE.

In response to many letters of encouragement and inquiry concerning the strike of printers employed on publications of The Penton Publishing Co., we are happy to state that, although publication is still attended by many difficulties, we feel that the backbone of the strike is broken. Our issue today goes to press on time with the usual number of pages. The strikers have withdrawn their demand for a closed shop and requested a conference, but this company will not consent to any agreement which, directly or indirectly, involves union control of its business. If the printers return, they must come as individuals.

NO INTERNATIONAL ALLOTMENT OF RAIL TERRITORY.

A year ago comment was made in these columns on the agreement which had then just been effected between rail producers in certain foreign countries, and was then being ratified by others, so as to include the British, German, Belgian and French mills, and the opinion was expressed that it would be difficult to add the American mills as parties to the agreement. It was subsequently rumored that the American mills had been taken in, on the basis that they should be given a free field on the American continent. Direct information has been entirely lacking as to the truth or otherwise of most statements regarding these rail agreements. Detailed statistics are now available, through September of this year, of rail exports by the United States and Great Britain, though not by other countries. These statistics do not indicate the existence of any agreement, although the evidence would be more convincing had this period not been one in which the American mills had no great reason to seek foreign business in rails. They have, however, exported considerable tonnages, 29,180 tons in September and 219,248 tons in the first nine months of this year. Indeed, the exports to all countries other than Canada have increased, from 134,784 tons in the first nine months of 1904 to 211,874 tons in the same period this year.

Following are the statistics:

United States Steel Rail Exports, gross tons:

	September,		First 9 mos.,	
	1904.	1905.	1904.	1905.
British North America	44,706	2,694	137,962	7,374
Mexico	3,278	2,244	21,876	44,223
Central America and British Honduras	206	.....	3,815	10,804
West Indies and Bermuda	1,432	7,655	6,062	25,040
South America	1,201	15,153	16,796	88,368
Europe	1,167	608	9,728	17,474
British Africa	78	.....	1,119	3,234
All other Africa	416	.....	619	.....
Japan	4,970	741	25,747	8,412
Other Asia and Oceania	4,971	85	49,031	14,319
Totals	62,425	29,180	272,746	219,248

British Steel Rail Exports, gross tons:

	September,		First 9 mos.,	
	1904.	1905.	1904.	1905.
Canada	8,860	4,040	39,739	22,855
Chili	2,096	.....	6,431	12,787
Argentine Republic	22,279	9,692	63,400	71,485
British South Africa	6,188	210	49,188	24,374
British East Indies	11,814	12,817	113,017	130,769
Australia	1,779	3,939	13,177	13,937
New Zealand	2,520	1,298	8,613	8,517
Russia	.....	.....	3,385	.....
Sweden	.....	4,741	23,243	22,422
Other countries	9,479	8,444	91,413	107,531
Totals	64,945	45,181	411,606	414,677

If effective at all, the agreement which was rumored in the latter part of last year would have been operative this year, but the figures show that Great Britain and the United States have been parties to no agreement requiring them to confine exports of rails to their own hemispheres. The United States has sent 43,439 tons of rails to the other hemisphere in the first nine months of this year, against 86,244 tons in the same period last year. This is a decrease, but it is easily explained as due to less desire to export rails. England, on the other hand, sent 107,127 tons of rails to Canada, Chili and the Argentine Republic in the first nine months of this year, against 109,570 tons in the same period last year.

In view of the secrecy surrounding international rail negotiations, nothing but the actual outcome, as here presented in the statistics, is conclusive, but it must now be accepted that there is no international agreement dividing the territory. It seems to be a natural corrolary that there is no agreement of any sort with the American mills. That the continental mills have an agreement is pretty well understood.

Incidentally, the above tables present very interesting figures regarding Canada. The new duty

became generally effective August 27, 1904, but rails which had been bought prior to that date were allowed to come in free through the following November. Accordingly, there was a very heavy movement of rails from the United States to Canada through October or November of last year. With no duty the American mills had the bulk of the business, 137,962 tons for the first nine months of the year, against 39,739 tons for Great Britain. This year, however, the duty is effective, being generally $7.00, with a preference of one-third off to Great Britain, and an anti-dumping provision, which could be made effective against the Unitel States to a maximum of one-half, making a total duty of $10.50. The alignment has therefore been reversed this year, Great Britain sending to Canada 22,855 tons in the first nine months, and the United States only 7,374 tons.

BASIS OF PERMANENT PEACE.

In our last issue we quoted several recent decisions establishing the illegality of the closed shop when coercion is attempted. Our attention has since been called to another decision which holds that the closed shop is illegal even when there is no coersion. In the case of Adams against Brennan, the Supreme Court of Illinois held that a board of education can not make a contract restricting employment on the erection of a school building to union labor. The Court said: "The contract tends to create a monopoly and to restrict competition in bidding for work. The board of education may stipulate for the quality of material to be furnished, and the degree of skill required in workmanship; but a provision that the work shall only be done by certain persons or classes of persons members of certain societies, necessarily creates a monopoly in their favor. The effect of the provision is to limit competition by preventing contractors from employing any except certain persons, and by excluding therefrom all others engaged in the same work, and such a restriction is illegal and void." If a board of education can not enter into such a contract, a private individual could not do so, and employers who are asked to sign contracts to employ only members of the union are invited to enter into a conspiracy to do an illegal act, and to deprive citizens of the United States of rights guaranteed them by the laws of the states and the constitution of the United States.

Aside from the legal aspects of this subject is the question of policy as affecting the relations of labor and capital. An officer of one of the largest labor unions in the United States, who has spent years in working for his union, said to the writer within a few days, that he was opposed to demanding the closed shop. While in his opinion there might be times when such a demand would be justifiable, such instances would be extraordinary. He believes that to compel an employer to consent to the closed shop contract is to make him do something which he feels he ought not to do, and places him in a belligerent frame of mind, so that upon the slightest provocation there is likely to be trouble between him and his employes. The idea of this labor leader that the employer who is coerced into doing something which he believes is wrong, will at the first opportunity, fight for the right to employ men as he pleases, is one which is entertained by many of the most intelligent and fair-minded labor unions. There can not be any permanent industrial peace founded on coercion. If war between capital and labor is to be abolished, it must be by the thoughtful consideration of differences and by the appeal to reason only.

MAGNITUDE OF THE STEEL CAR INDUSTRY.

The steel car plants of the country are now making close to 225 steel cars every working day, and are making improvements which will, some time early next year, bring their daily output up to about 275 cars daily. They are sold up for about a year ahead, even having regard to the prospective increase in capacity. An independent concern, heretofore making wooden cars only, is about to build a steel car plant which will have an output of 25 cars or more daily, so that the total prospective output of the country is about 300 cars daily, this figure having regard to actual output on the current run of business, and not to such outputs as can be made occasionally on a sepcial run.

This speaks very well indeed for an industry which recently, when total capacity was less than it is now, ran for a period of more than a year at less than 25 percent capacity.

The steel car industry is naturally an enormous consumer of steel. While the original type of steel car was one weighing about 40,000 pounds and having a capacity of 100,000 pounds, smaller cars are being built for certain purposes, particularly for use in the Lake Superior ore region, and the average weight of all cars turned out is less then 40,000 pounds. It can be estimated roughly that in 1906 the steel car industry will consume considerably more than 1,000,000 tons of rolled and forged steel products, including plates, shapes, merchant bars and axles, while adding to the pig iron used for the production of this material the pig iron used in wheels and malleable and steel castings there is indicated the equivalent of well over 1,500,000 tons of pig iron to go into steel cars.

There is plenty of work ahead for the steel car industry. There are now about 1,800,000 freight cars in use by the standard railroads, of which less than one-eighth are steel or steel underframed. The wooden cars are being replaced with steel cars, and additions are being made to the total number of cars. Besides this there is the new field just being opened up in the line of all-steel passanger, mail, baggage and express cars.

MONEY RATES SOAR AND STOCKS DECLINE.

NEW RECORDS ARE SET FOR CALL MONEY ON STOCK EXCHANGE.

Industrial Securities Share in General Decline.—Some Notable Exceptions.

The money situation has forged steadily to the front during the past week and is now decidedly the market feature. Industrial securities have lost their well-established position as the market leaders. Call money has gone soaring to levels high above those reached in the period of stringency a month ago and prices of securities have sagged steadily and heavily, steel and allied stocks generally sharing in the decline. All this has come, too, in the face of ample and substantial evidence of unprecedented prosperity in the iron, steel, mining and manufacturing industries. The slump began early last week, the confusion incident to elections being held responsible. The unsettled condition of affairs in Russia was also blamed in part for a continuance of the decline, but the real source of trouble was apparent Thursday and Friday when call money went to 15 percent. A bank report less favorable than was anticipated gave the market no encouragement toward recovery on Saturday and the opening on Monday was weak, money rates early setting a new high record for the year by climbing to 25 percent. Tennessee Coal & Iron and Railway Steel Spring were the notable industrial exceptions to the general downward trend, both recording good advances for the week with dealing heavy. The Steel securities, American Locomotive, Colorado Fuel & Iron and American Car & Foundry were subject to considerable activity, but closed the week at figures considerably below those of the previous Monday. The impression prevails that speculators are testing the recent prediction of Mr. Vanderlip,—that speculation on any extensive scale with money as scarce as it has been this fall will provoke most serious trouble—and are finding that it is true.

Republic Iron & Steel Co.

The annual report of the Republic Iron & Steel Co., issued Nov. 10, shows net profits of $1,373,607, as against a deficit last year of $254,188, a gain of $1,627,795 over 1904. The fiscal year of the corporation ends on June 30, and the report had been expected for some time. Arrangements for the payment of back dividends on the preferred stock are to be made at a later meeting of the executive committee. The surplus, $4,030,329, equals 6.72 percent on this stock.

President Alexis W. Thompson in his report to the stockholders says:

"The conditions prevailing during the fiscal period ending June 30, 1905, were the reverse of those prevailing during the preceding year. The demand for iron and steel products improved from the outset. The volume of business gained steadily, although prices did not show much improvement for the first six months of this period; dur-

THE LEADING INDUSTRIAL SECURITIES.

	Closing Quotation Nov. 4.	Closing Quo. Nov. 11	Changes	Date of 1905 Ann. Meet.	Par Value	Capital Outstanding	Dividend Basis	Dividend Being Paid	Dividend Date Last Div. Dec.
Allis-Chalmers Co.	19⅜	19	— ⅜	Sept. 7	100	19,820,000		.....	.....
Allis-Chalmers preferred	62	61¼	— ¾		100	16,150,000	7 cum	.....	Feb., 1904
American Can	10½	9⅝	— ⅞	Feb.	100	41,233,300		.....	.....
American Can preferred	70¼	70	— ¼		100	41,233,300	7 cum	5 Q.	Oct., 1905
American Car and Foundry	40¾	39	— ¾	June 29	100	30,000,000		.....	May, 1905
American Car and Foundry preferred	100⅝	100	— ⅝		100	30,000,000	7 n. c.	7 Q.	Oct., 1904
American Locomotive	68⅝	66¼	—2⅜	Oct. 17	100	25,000,000		.....	.....
American Locomotive preferred	114¾	114½	— ¼		100	24,100,000	7 cum	7 Q.	Oct., 1905
American Shipbuilding	56⅜	55½	— ⅞	Oct. 4	100	7,600,000	4	4 Q.	Dec., 1905
American Shipbuilding preferred	105	105	.....		100	7,900,000	7 n. c.	7 Q.	Oct., 1905
American Steel Foundries	13	12⅜	— ⅝	Oct. 3	100	17,700,000		.....	.....
American Steel Foundries preferred	45½	45	— ½		100	17,700,000	6 cum	.....	Aug., 1904
Barney & Smith	20	18	—2	June 6	100	1,000,000		.....	June, 1893
Barney & Smith preferred	125	125	.....		100	2,500,000	8 cum	8 Q.	Sept. 1905
Bethlehem Steel	28¼	29	+ ¾	April 4	100	15,000,000		.....	.....
Bethlehem Steel preferred	85	84	—1		100	15,000,000	7 n. c.	7 Q.	Nov., 1905
Bullock Electric preferred	112⅞	114	+1⅛	Oct. 1	100	1,000,000	6	6 Q.	Oct., 1905
Cambria Steel	28⅞	28	— ⅛	March 21	50	45,000,000	6	3 S. A.	Aug., 1905
Cambria Iron	49¼	49¼	.....		50	8,468,000	4	4 S. A.	Oct., 1905
Colorado Fuel & Iron	44½	43⅝	— ⅞	Oct. 16	100	30,132,000	7	.....	Apr., 1902
Wm. Cramp & Sons Ship & Eng. Bldg. Co.	28	28	.....	May 25	100	6,098,000	5	.....	Nov., 1902
Crucible Steel	13¼	13	— ¼	Oct. 18	100	25,000,000		.....	.....
Crucible Steel preferred	67⅛	67	— ⅛		100	25,000,000	7 cum	.....	Sept., 1903
Empire Steel	6	7⅝	+1⅝	Feb. 22	100	2,281,400		.....	.....
Empire Steel preferred	35	38	+3		100	2,500,000	6 cum	3 S. A.	Jan., 1905
Fay & Egan	60	60	.....	Feb. 21	100	1,000,000	5	5 Q.	.....
Fay & Egan preferred	118	118	.....		100	1,000,000	7 cum	7 Q.	Nov., 1905
General Electric	186	185	—1	May 9	100	48,256,050	8	8 Q.	Oct., 1905
International Pump	28	26	—2	June 6	100	12,262,500		2	July, 1905
International Pump preferred	82	82	.....		100	8,850,000	6 cum	6 Q.	Nov., 1905
Lackawanna Steel	80	81	+1	March 8	100	34,971,400		.....	.....
Lake Superior Corporation	17	17	.....		100	40,000,000		.....	.....
Niles-Bement-Pond	121	121	.....	Feb. 1	100	5,000,000	6	6 Q.	Sept., 1905
Niles-Bement-Pond preferred	103⅝	103⅝	.....		100	2,000,000	6 cum	6 Q.	Nov., 1905
Otis Elevator Co	62	61	—1	March 20	100	6,350,300		2 A.	Apr., 1905
Otis Elevator Co. preferred	107	107	.....		100	5,589,500	6 n. c.	6 Q.	Oct., 1905
Pittsburg Coal Co	15½	15	— ½	Feb. 11	100	30,135,000		.....	.....
Pittsburg Coal preferred	52½	52½	.....		100	30,716,200	7	.....	Apr., 1905
Pressed Steel Car	50⅝	48⅝	—1⅝	Feb. 15	100	12,500,000	3		Aug., 1904
Pressed Steel Car preferred	99	97⅞	—1⅛		100	12,500,000	7 n. c.	7 Q.	Nov., 1905
Pullman Palace Car	248	243	—5	Oct. 19	100	74,000,000	8	8 Q.	Nov., 1905
Railway Steel Spring	54½	56⅞	+2⅜	March 2	100	13,500,000		4 S. A.	Oct., 1905
Railway Steel Spring preferred	103½	103½	.....		100	13,500 000	7 cum	7 Q.	Sept., 1905
Republic Iron & Steel	25¼	2 ⅝	— ⅛	Oct. 18	100	27,352,000		.....	.....
Republic Iron & Steel preferred	94⅜	94⅝	+ ¼		100	20 852,000	7 cum	7 Q.	Oct., 1905
Sloss-Sheffield	72¾	74½	+1¾	March 15	100	7,500,000	5	5	Oct., 1905
Sloss Sheffield preferred	112½	112½	.....		100	6,700,000	7 n. c.	7 Q.	Oct., 1905
Tennessee Coal & Iron	90½	94⅞	+4⅜	May	100	22,552,800		4 Q.	Nov., 1905
U. S. Cast Iron Pipe & Foundry	39⅝	38⅜	—1⅛	June 28	100	12,500,000		1	Dec., 1905
U. S. Cast Iron Pipe & Foundry preferred	96½	96½	— ½		100	12,500,000	7 n. c.	7	Dec., 1905
U. S. Steel	37¼	36⅞	— ⅜	April 17	100	508,302,500		.....	Dec., 1903
U. S. Steel preferred	104⅞	101⅞	—2¼		100	360,281,100	7 cum	7 Q.	Nov., 1905
U. S. Steel 5's	97	95⅞	—1⅛		100	463,798,000	5	5 A.	.....
Virginia Iron, Coal & Coke	48	47	—1	Sept. 19	100	8,641,000		.....	.....
Westinghouse Electric	172	170	—2	June 28	50	20,906,350	10	10 Q.	Oct., 1905
Westinghouse Air Brake	149½	149½	.....	Oct. 3	50	10,990,450	20	20 Q.	Oct., 1905

ing the last six months, however, prices advanced and profits became much more satisfactory.

"The gross sales amounted to $22,188,842.79, an increase of $4,946,273.41 over those of the previous year, while the net profits from operations amounted to $1,373,607.55, against a loss of $611,484.18 the year before.

"At the beginning of the year 1905, substantially all our plants were in full operation, and the cost of production decreased materially.

"During this period $728,980.37 was expended for new construction, the larger part of which was required for the completion of our rail mill, sheet and tin bar mill at the Bessemer plant in Youngstown, Ohio, the contracts for which were let in November, 1904. The new rail mill was put in successful operation on April 22, 1905, and since that time the results have fully justified the expenditure, enabling the company to increase the variety of its products and to finish at its own mills the steel products of its Bessemer converters.

"Contracts have also been let for the erection of a new blast furnace, metal tracks and of a mixer, so that the company may procure a large percentage of molten metal for direct use in its converters, thereby again reducing the cost of steel material. During the past fiscal year the Bessemer plant produced 405,000 tons of finished steel. Its product should increase in this calendar year to 500,000 tons, and, when the above improvements are completed, to 600,000 tons. The development of our coking coal lands has progressed very satisfactorily. The work is well under way, and, in the near future, the company will supply itself with all the coke required for the blast furnaces in the valley district.

"Since our last report the financial arrangements of the company then under negotiations, have been successfully terminated, an issue of $10,000,000 of bonds having been placed. The collateral trust notes heretofore issued have largely been paid, and the remainder thereof will be redeemed, on or before maturity, in October, 1907.

"In common with all the other companies operating in the Birmingham district, our operations there were considerably interfered with by the differences with the miners. The effect thereof has, for a time, lessened our profits, but the situation is now under control and our works are in full operation. What labor differences we had in the north were quickly and satisfactorily adjusted in a conference at Detroit, in less than a week from the time negotiations began.

"All our plants are in the best physical condition and, with the company permanently financed and our order books filled well into next year, we look confidently for a very prosperous year."

PROFIT AND LOSS ACCOUNT.

Profits from the business of the Company after deducting all expenses, excepting reconstruction, renewals and repairs, collateral note and bond interest and sinking fund, and discount and expense in re bond issue		$2,508,068.28
DEDUCT.		
Amount expended for reconstruction, renewals and repairs	$803,866.59	
Interest on collateral notes and bonds	232,172.54	
Discount and expense in re bond issue (proportion of the year	98,421.60	1,134,460.73
Net profits for the year		$1,373,607.55
Surplus June 30, 1904		2,636,722.10
Surplus June 30, 1905		$4,010,329.65

BALANCE SHEET.

ASSETS.

Real estate, plants, buildings, machinery and other permanent investments		$41,947,049.26
NEW CONSTRUCTION.		
May 1, 1899 to June 30, 1900	$1,218,203.44	
July 1, 1900 to June 30, 1901	1,164,175.26	
July 1, 1901 to June 30, 1902	2,003,183.95	
July 1, 1902 to June 30, 1903	1,681,040.32	
July 1, 1903 to June 30, 1904	457,985.87	
July 1, 1904 to June 30, 1905	728,980.37	
		7,253,569.21
Stocks in sundry Companies at cost		439,338.07
Producing oil and gas wells, pipe lines and leases		260,823.72
Prepaid royalties on ore and prepaid mining expenses		589,095.36
Discount and expense in re bond issue—less pro rata for the year		658,952.13
Inventories of raw and finished materials—at conservative cost and below market value		3,852,342.81
Accounts and bills receivable		3,265,223.06
Fund in hands of First Trust and Savings Bank for redemption of our collateral notes		1,062,500.00
Cash on hand		4,303,604.83
		$63,632,498.45

LIABILITIES.

CAPITAL STOCK ISSUED.

Preferred	$20,852,000.00		
Less: in treasury	435,100.00	$20,416,900.00	
Common	$27,352,000.00		
Less: in treasury	161,000.00	27,191,000.00	$47,607,900.00
Collateral trust notes			2,759,000.00
First mortgage bonds			7,146,000.00
Collateral note coupons due July 1, 1905			78,750.00
Accrued interest on bonds			89,212.50
Accounts payable			1,279,117.73
Deferred payments on coal property			37,500.00
Reserve for taxes and insurance			244,091.04
Reserve for depreciation of ore and coal properties			311,696.32
Reserve for possible losses in collection of outstanding accounts and bills receivable			68,901.81
PROFIT AND LOSS ACCOUNT.			
Net profit for year		$1,373,607.55	
Surplus June 30, 1904		2,636,722.10	
Surplus June 30, 1905			4,010,329.65
			$63,632,498.45

Offices and Officers.

The offices of the company and their location are as follows: Executive offices, 111 Broadway, New York; general offices, First National Bank Building, Chicago; eastern sales office, 111 Broadway, New York; principal office in the state of New Jersey, No. 15 Exchange place, Jersey City; registrar of transfers, Chase National Bank, New York; transfer agent, The New York Trust Co., New York.

The following are the officers and directors: Executive committee, Charles S. Guthrie, chairman, Samuel G. Cooper, John W. Gates, Leonard C. Hanna, Grant B. Schley. Chairman of the board of directors Charles S. Guthrie; president, Samuel G. Cooper; vice presidents, George A. Baird, G. Watson French, Charles Hart, William H. Hessinger, Archibald W. Houston, John F. Taylor; treasurer, John F. Taylor; secretary, Harry L. Rownd; general counsel, Simpson, Thatcher & Bartlett; associate counsel, Harry Rubens. Directors, term expiring 1906, G. Watson French, Harry Rubens, John F. Taylor, Alexis W. Thompson, William H. Hessinger; term expiring 1907, George A. Baird, Charles S. Guthrie, Leonard C. Hanna, Archibald W. Houston, Earl W. Oglebay; term expiring 1908, Edward J. Berwind, Samuel G. Cooper, John W. Gates, Grant B. Schley, George R. Sheldon.

Financial Notes.

Earnings of the Sloss-Sheffield Steel & Iron Co. for October are estimated at $144,000 above interest and taxes. About 42,000 tons of pig iron were delivered during the month.

Applications are numerous for the issue of $1,100,000 first mortgage 5 percent first mortgage bonds, with which the Wellman-Seaver-Morgan Co. has refunded its bonded indebtedness. The fiscal agents for the new securities are Peabody, Houghteling & Co., Chicago.

Recent dividend declarations include the following. Niles-Bement-Pond Co., regular quarterly, 1½ percent on preferred stock payable Nov. 15; The Pratt-Whitney Co., regular quarterly, 1½ percent on preferred stock; Pittsburg, Bessemer & Lake Erie Railroad Co., semi-annual, 3 percent on preferred stock, payable Dec. 1; Wheeling Mould & Foundry Co., quarterly, 2 percent, payable Nov. 1; United States Stamping Co., regular quarterly, 2 percent, payable Nov. 1; Truss Steel Tie Co., distribution of stock in the National Cast Steel Co., recently acquired to the amount of 10 percent on its stock of $300,000, Pullman Co., regular quarterly, $2.00 per share; Pennsylvana Steel Co., regular semi-annual, 3½ percent on preferred stock, payable Nov. 1; National Steel & Wire Co., regular quarterly, 1¾ percent on preferred stock; Bethlehem Steel Corporation, regular quarterly, 1¾ percent on preferred stock, payable Nov. 1; International Steam Pump Co., regular quarterly, 1½ percent on preferred stock, payable Nov. 1; Henry R. Worthington, Inc., regular semi-annual, 3½ percent on preferred stock, payable Nov. 1.

BUSY TIMES

IN IRON AND STEEL BUSINESS IN ENGLAND CONTINUES.

Expected Advance in Marked Bars Announced, But Other Prices Have Not Changed—More Puddling.

(Special Correspondence.)

BIRMINGHAM, ENGLAND, Nov. 1.—The expected rise in marked bars has come at last. The makers held a conference Oct. 30, and decided to send out circulars announcing an advance of 10 shillings per ton to take effect from Nov. 1. This brings the basis price to £8, 10s, 0d, and represents the first change since January, 1904. Changes in this commodity are not frequent, the last named alteration being the first for three years. The variations in this class of iron have not the importance they once had, as there are only five firms making this famous South Staffordshire brand of iron. They are Round Oak Iron & Steel Works, Brierley Hill; N. Hingley & Sons Ltd., Netherton Iron Works, Dudley; William Barrows & Sons (per B. Bunch & Sons), Bloomfield Iron Works, Tipton; John Bagnall & Sons, Leebrook Iron Works, Wednesbury and John Bradley & Co., Stourbridge Iron Works.

The effect of this change will be to give a further fillip to unmarked iron, the standard of which may be expected to rise shortly.

No More Advances.

For the first time since the commencement of the boom there were no declared advances on Birmingham exchange last week. This may be taken as evidence of a disposition to let well alone, as well as proof of the operation of steadying influences. Advances have been large enough and numerous enough to satisfy the most exacting and excitable. There is nowhere any retrogression. The mills which in busy times start on Monday night, are going one better by commencing on Monday morning while blast furnaces are so full of work that no more orders will be wanted for the next six months at least. In many cases the smelters have refused twice as much as they have booked. Wherever possible, furnaces are being got ready for re-lighting, the latest addition being one belonging to Sir Alfred Hickman, at Springvale.

Tendency Upward.

While price standards are unaltered, the tendency is decidedly upward. Thus galvanized sheets with a standard minimum of £11 15s realize without difficulty £12 5s, and in some cases even £12 10s. The stimulus in this case is spelter, which now stands at £29 10s, believed to be the highest figure by £1 ever obtained in the English market. In regard to pig the steady rise in coke has in some cases, especially in South Staffordshire, absorbed every penny of the advance in pigs.

One of the most interesting discussions at the recent Sheffield Conference of the Iron and Steel Institute, was recalled by a lecture delivered in Birmingham, on Thursday last, by Alex. E. Tucker, on "Vanadium Steel for Motor Construction." Mr. Tucker is president of the Automobile and Cycle Engineers' Institute, and is well known as an expert metal chemist, having offices both at Dudley and at 35 Paradise street, Birmingham. His lecture, which was illustrated with lantern slides, went to show that vanadium was so constituted as to absorb the shocks of motors very much better than ordinary mild steel. Vanadium cranks by the hundred, he says, are in use for motor cars subjected to extraordinary and complex strains. The lecture was greatly appreciated by the technical experts present.

Revival of Puddling.

Among the curious and unexpected effects of the boom is the restoration of puddling furnaces. A number of South Staffordshire works relying on the supplies of German, American and Welsh steel billets, pulled down their furnaces. Many of these are regretting their rashness. Germans are no longer sending billets except on old contracts, South Wales, with unlimited orders for finished steel, can spend her time more profitably than in making raw material for sheet makers, and the result is a most embarassing dearth. Buyers discovering this have in many cases elected to return to iron sheets as the only means of getting their orders executed. Consequently puddled bars are at a premium. Three months ago they could be bought for £3 12s 6d. Parcels changed last week at £4 10s, and the buyers were glad to get them at this price. Several demolished puddling furnaces are in course of re-construction, the most striking case of the kind being a couple pulled down in the early summer of this year. In this direction general calculations have been completely upset.

CINCINNATI FOUNDRYMEN AND FOREMEN.

On Saturday evening, Nov. 11, the Cincinnati Foundry Foremen's Association entertained the foundrymen of Cincinnati. The meeting was held at the Grand Hotel with 44 members and guests in attendance. An elaborate dinner was served. The toastmaster then introduced J. I. Reardon, president of the Club, who explained in a few words the object of the association, and the reason for inviting the foundrymen to meet with them. H. M. Lane, editor of *The Foundry*, spoke on the "Evolution of Foundry Metallurgy," concluding with a few statements concerning the work of the Foundrymen's Association and the Associated Foundry Foremen. Remarks upon the same subject were also made by Fred J. Brunner, of the S. Obermayer Co., of Cincinnati. Fred W. Weirrmann spoke upon "Parting Material," and illustrated his remarks by a few simple experiments with the various parting materials on the market. When the meeting finally adjourned at a quarter to twelve, all agreed that they had had a very pleasant and profitable evening.

Work has been started on the million-dollar canal project of the Colorado Fuel & Iron Co. This will divert a heavy stream of water from the Arkansas river near Adobe, Colo., to the steel works at Pueblo. Owing to the hilly topography of the territory to be traversed, several tunnels will be necessary, one of them 1,100 feet long, and it is understood this work will be completed before excavation for the canal proper is started.

The National Enameled Iron Co., recently incorporated at Wheeling, W. Va., with a capital of $125,000, has started work on the remodeling of the old plant of the Wheeling Heating & Ventilating Co. of Elm Grove, which has been taken over by the new corporation. The furnace department of the old plant is in good shape, but two large buildings will be erected. The plant will be operated by George Blackham of Latrobe, Pa., and his son, George J. Blackham.

The Struthers mill, of the American Sheet & Tin Plate Company, at Youngstown, will resume operations November 26, after an idleness since June 22. While shut down the plant was thoroughly repaired.

INTERESTS CLASH.

At Sittings of Canadian Tariff Commission—Important Trade Agreement.

(Special Correspondence.)

TORONTO, CAN., Nov. 11.—At the sittings of the Dominion Tariff Commission in Montreal, which began Nov. 7, the iron and steel interests were heard. The statement submitted developed some clashing of interests between those engaged in the primary stages of manufacture, and the class who use the products of the former as raw material. The Montreal Rolling Mills, Peck Rolling Mills and Dominion Wire Manufacturing Co., recommended that no change be made in the duty on wire nails, unless it were decided to put a duty on wire rods in which case they would ask a corresponding increase in the present duty on wire nails. As regards wire and wire goods J. C. McCormack, president of the Dominion Wire Mfg. Co., made a separate statement, stating that it was manufacturing barb wire under agreement with the United States Steel Corporation, to the effect that if the rods were purchased from the corporation, it (the Dominion company) would be allowed to manufacture and market a certain tonnage in Canada, to be sold at such price as might be fixed from time to time, f. o. b. Cleveland. The method of selling all sizes of galvanized wire is the same; viz., Cleveland price plus freight to selling point. The Dominion company asked imposition of 50 cents per 100 pounds specific duty, or at least 20 percent ad valorem on galvanized and barb wire, if raw material remains duty free, but should steel rods be placed on dutiable list, it asks a corresponding increase on all wire manufactures.

C. C. Ballantyne, chairman of the Canadian Manufacturers' Association, said that the bulk of the cases to be submitted on behalf of industries affiliated with the association were not ready, and would be presented later.

The Dominion Iron & Steel Co., has made a large addition to its coal-washing plant at Sydney, N. S., including a trestle, pockets and conveyors to provide for the storage of 15,000 tons of coal. On Nov. 7, last, the company made a shipment of 39 carloads aggregating 2,000 tons of its output, principally steel rails, by the Intercolonial railway.

The Manitoba Iron Works, Ltd., of Winnipeg, has completed its contract for a water-tower for the town of Portage la Prairie, Man., the most extensive work of the kind so far undertaken in the Canadian West. It has been awarded the contract for the steel legs and machinery for the Anchor Cereal Co.'s elevator, Winnipeg.

Col. Henry M. Pellatt, of Toronto, director of the Dominion Iron & Steel Co., and prominent in the financial world, was knighted by King Edward in connection with the annual distribution of "birthday honors."

D. H. Ross, Canadian commercial agent at Melbourne, Australia, reports that on the occasion of the annual agricultural show in that city, the local agents of a well-known agricultural implement firm of St. George, Ont., exhibited several leading lines, some of them new to the country, which attracted considerable attention. As these implements have been successfully introduced into New Zealand, there is every prospect of business being done in Victoria. An order has recently been forwarded from Melbourne to a Peterborough, Ont., company, for a sample shipment of farming implements built to Australian specifications.

RAILROAD RATE REGULATION.

Urged By Hardware Manufacturers.—Shontz Tells Progress of Work on Canal.

(Special Correspondence.)

Washington, Nov. 11.—The American Hardware Manufacturers' Association and the National Hardware Association have been in annual convention in this city during the greater part of the week. One of the most important actions taken by the manufacturers was the passage, after extended discussion, of a resolution introduced by Mr. E. B. Pike of Pike, N. H. endorsing the plans for railroad rate regulation proposed by President Roosevelt and advocating the enactment of legislation along these lines at the next session of Congress. There was also passed a resolution introduced by Mr. Kretsinger "approving a plan to reorganize the consular service on a business basis that it may become more serviceable in the extension of our foreign trade by the creation of larger markets for our products."

A vigorous address upon the dangers that are supposed to threaten our foreign trade was made by Mr. William M. Pratt of Greenfield, Mass., a member of the Tariff and Reciprocity Committee of the association. He declared that if this country desires to hold its present export trade it will be necessary to inaugurate a broader commercial policy either in the form of reciprocity, trade agreements or a dual tariff. Speaking from personal experience he said: "For twelve years our own firm has been building up an export trade on mechanics' tools, selling to every country, until 45 per cent of our total output was exported. We had a large trade with Germany and France until the new tariff conditions in Europe put us out of competition. The Germans can now undersell us in those markets."

The election of officers resulted in the selection of the following: President, F. S. Kretsinger, of Cleveland, Ohio; First Vice President, C. W. Ashbury; Second Vice President, George W. Corbin of New Britain, Conn.; Third Vice President, Wm. M. Pratt of Greenfield, Mass.; Secretary, F. P. Mitchell, Executive Committee, Robert Garland, chairman, Samuel Desston, John E. Harbster, William H. Hayes, William Gaussing, C. F. Carrier, Edward Ingalls and E. M. Kemp. The next meeting of the association will be held six months hence at Hot Springs, Va.

The convention closed with a banquet at which addresses were made by Representative T. E. Burton, James R. Garfield of the Department of Commerce and Labor, O. P. Austin, chief of the Bureau of Statistics, and others. At a joint meeting of the two hardware organizations Chairman Theodore P. Shontz of the Isthmian Canal Commission delivered the most important pronouncement thus far made as to the progress and prospects of the enterprise under way at Panama. He stated that the purchases thus far made by the Panama Commission amount to more than $9,000,000 and include 61 steam shovels; 1,300 flat cars; 12 rapid unloaders; 22 unloading plows; 13 earth spreaders; 324 dump cars; 12 hoisting engines; 120 locomotives; 5,000 tons of steel rails; 14 air compressing machines; 3 cranes; 152 rock drills; 2 dipper dredges; 3 steel water tanks and towers; 12 stand pipes and 2 ocean steamships.

The Bourne-Fuller Co., Cleveland, jobber in iron, steel and coke, has opened a Pittsburg office at 1126 Frick building. It will be in charge of Norris J. Clarke, who has called on the Pittsburg trade for this company for some time.

PERSONAL.

H. F. Stevens, formerly salesman with Kelley, Maus & Co., Chicago, has taken charge of the iron and steel sales department of C. E. Louis, The Rookery, Chicago.

Robert McF. Doble, consulting engineer of San Francisco, has severed connection with the Abner Doble Co., in order to resume his individual practice.

John M. Bush, of the Ashland mine, Ironwood, Mich., of the Cleveland-Cliffs Iron Co., has been appointed superintendent of the Crosby, on the Mesabi range.

W. H. Gibson, for many years superintendent of construction of the Homestead Steel Works, Pittsburg, has tendered his resignation. He will be succeeded by Peter Isle.

W. H. D. Totten Jr., formerly manager of sales of the Carnegie Steel Co., Cincinnati, O., has gone into business for himself, with offices in the Union Trust Bldg., Fourth and Walnut streets

James S. Church, formerly superintendent of the Milwaukee plant of the Allis-Chalmers Co., is to be at the head of the new school of trades which is to open in that city, probably on Dec. 1. He is vice president of the Milwaukee Boiler Co.

George R. Murray has been appointed general manager of sales of the Ingersoll-Rand Co., with offices at 11 Broadway, New York. For the past two years Mr. Murray has been in Cleveland acting as general superintendent of branches and agencies.

O. M. Stowe, for the past ten years secretary and treasurer of the Union Malleable Iron Co., Moline, Ill., has resigned and will become purchasing agent of the Janney Mfg. Co., now at Ottumwa, Iowa, but which is soon to remove to Columbus, Ind. At its new location the Janney Company is building an extensive plant for the manufacture of farm implements. Mr. Stowe will be a stockholder in the company.

THE OHIO SOCIETY OF MECHANICAL ELECTRICAL AND STEAM ENGINEERS.

The Ohio Society of Mechanical, Electrical and Steam Engineers will hold its eleventh annual meeting on Nov. 17 and 18, at the City Hall Building, Canton, O. There will be three sessions on Friday, and two on Saturday. A synopsis of the program is as follows:

Friday, Nov. 17, 10:00 a. m. Business meeting of the Society and president's address.

Afternoon Session, 1:30 p. m. Papers will be presented as follows: "Switchboards" by Henry Jackson. "Pumping Engines and Machinery" by Oscar F. Rabbe. "Compressive Strength of Materials" by Robert A. Ovin. "Losses in Power Plants" by Chas. N. Harvey.

Evening Session, 7:30 p. m. The following papers will be presented: "The Heat Unit and Its Application to Steam Heating" by Geo. G. Bennett. "The Hand Writing of Mechanics" by Eugene Ransom. "Raising Water by Compressed Air" by Gustav G. H. Freiderick. "Electric vs. Steam Locomotives," by R. H. Probert.

Saturday, Nov. 18, 8:00 a. m. Business meeting of the Society.

Evening Session, 6:30 p. m. Unfinished business and election of officers.

At the conclusion of the morning session the delegates will inspect the works of the Buckeye Engine Co., and will inspect the works of the Moran Engineering Co. in the afternoon.

The secretary is C. J. Miller, Canton, O.

OBITUARY.

Ralph Bainbridge Hoff, manager of the Pittsburg Steel Mfg. Co., died Nov 7 of typhoid fever, at the home of his mother, Cumberland, Md.

Joseph Nelson, a veteran business man of Milwaukee, died recently at the home of a daughter in Chicago. He was for a time engaged in the manufacture of machinery at Milwaukee.

William D. O'Neil a well known coal man, died Nov. 7, at his home in Neville Island, Pa. He was the principal owner of the O'Neil Coal Co., operating mines at Elizabeth, Pa. When these holdings were sold to the Monongahela River Consolidated Coal & Coke Co., he became its secretary.

Hiram P. Huxford, for many years a prominent iron man, died Nov. 3, at his home in Utica, N. Y. He was 80 years of age. For a time he was associated with his father in the foundry business at Willowvale under the name of Huxford, Rogers & Spencer, but later he removed to Clayville, N. Y., where he started the furnace company of Huxford, Millard & Pettee.

C. I. Bewley, president of the Oregon Foundry & Machine Co., Oregon, Ill., died Nov. 2, very suddenly from neuralgia of the heart. Although a resident of Oregon only a little over five years, he was one of the most prominent commercial men of that city. Mr. Bewley was formerly superintendent of the McCormack Machine Works, of Chicago. He was 61 years old.

Charles White, a pioneer in the iron business in Washington, D. C., died recently at his summer home in Prince George county, Md., at the age of 81. Mr. White furnished all the iron work for the Smithsonian Institution and a large part of that used in the construction of the Capitol, treasury, patent office and post office. Later he became interested in street railroads.

John L. Gill Jr., a member of the American Society of Mechanical Engineers and other engineering societies, died at Philadelphia, Nov. 7. In his early career he was associated with his father at Columbus, O., in the manufacture of railroad cars. Later he had extensive car and car wheel works at Pittsburg and in recent years lived in Philadelphia, where he engaged in the manufacture of water-tube steam boilers. He was 70 years of age.

David Maxon Greene, one of the best known civil engineers in the country, died Nov. 9, at his summer home in Adams, Jefferson County, New York. He was born in Brunswick, July 8, 1832, and in 1851 graduated from the Renselaer Polytechnic Institute of Troy. He had charge of many important engineering enterprises and served with distinction with the engineering corps in the civil war. In 1878 he became the director of the Renselaer Polytechnic Institute, a position which he filled for thirteen years.

George Mills, who has been connected with the Sweet's Steel Co. as melter and superintendent of its open-hearth steel department at Syracuse, N. Y., and at Newberry, Pa., for the past six years, died at Williamsport, Pa., on November 8, 1905. Mr. Mills was born at Lowel,, Mass., on April 17, 1851. As a boy he was employed for several years in the Norway Iron Works at South Boston and later in the rolling mill at East Bridgewater, Mass. The body was interred at the latter place. Mr. Mills is survived by a wife and two sons.

The furnace of the Kittanning Iron & Steel Mfg. Co., Kittanning, Pa., was blown in Nov. 14, after an idleness of about two months.

Plant of the Leland & Faulconer Mfg. Co. at Detroit, Mich.

BY AN EDITORIAL REPRESENTATIVE OF THE IRON TRADE REVIEW.

Most manufacturers throughout the United States, and, in fact many beyond the limits of this country, have long known the name of the Leland & Faulconer Mfg. Co., and its reputation for accurate and careful work. In the past the company has developed and manufactured a number of special lines, including the Leland & Faulconer grinders.

GENERAL VIEW OF FOUNDRY.

It will also be remembered that it was this company that made the hardened beveled gears for bicycle transmission by a process in which the teeth of the gears were accurately ground. As the bicycle has gone out and the automobile has come in, it is but natural that this company should turn its attention to automobile work. At first the work was confined to the manufacture of high grade castings for automobile companies, but finally an arrangement was made with the Cadillac Automobile Co., by which

CORE DEPARTMENT.

the Leland & Faulconer Co. manufactured the engines and transmission gear for all Cadillac cars. In describing the plant it would be natural to follow the work through from the foundry to the finished engine, hence, the description will begin with this part of the equipment.

The foundry is situated in a building 272 ft. x 80 ft. and has some unique features incorporated in its design. The roof is of light steel truss construction covered with metal beneath which there is places several layers of asbestos to serve the triple purpose of heat insulation, fire-proofing and prevention of the dripping of water of condensation from the roof in damp weather. The walls of the foundry are constructed entirely of glass from the eaves to the top of the molders' benches.

As only a limited amount of heavy jobbing work is done, a five-ton steam hydraulic crane is found sufficient to take care of this work and to pour the heavy castings. The balance of the molds are light floor work or bench work.

The cupola is 54 in. in diameter inside of the lining and is provided with two tapping spouts, one on each side, so that a heat may taken off very quickly. Adjoining the foundry at one end there is a storage shed, having storage bins on the ground floor for molding sand, seacoal, flour, coke, soft coal, etc. On the second floor there is a storage for pig iron. During the summer a large portion of the pig iron

PATTERN STORAGE.

is stored in the yard and much of the coke is also stored in this manner.

The core department is situated at the end of the foundry furthest from the cupola, and is equipped with two ovens, the necessary benches, etc.

After the castings leave the foundry they pass into the clean-

ing department which is situated in an adjoining building. In this department are several rooms devoted to different parts of the work. The cleaning mills are all of the exhaust type and are situated in a room by themselves. The grinding room is also equipped with grinding stands provided with hoods, an exhaust system taking away the dust. The pickling room is provided with vats for pickling such castings as require this treatment.

All automobile cylinders are tested under hydraulic pressure before they leave the foundry, and a special testing bench has been fitted up for carrying on this work.

GEAR CUTTING DEPARTMENT.

Adjoining the foundry is the wood pattern shop which is equipped with one 30 in. planer, one combination cross cut and rip saw, one jointer, two modern iron bed lathes provided with rack longitudinal and screw cross feed, one 36 in. band saw, one jig saw, several trimmers and benches for

ENGINE ERECTING STANDS.

10 patternmakers. Metal patterns are made in the machine shop. The pattern storage is located over the pattern shop and cleaning department.

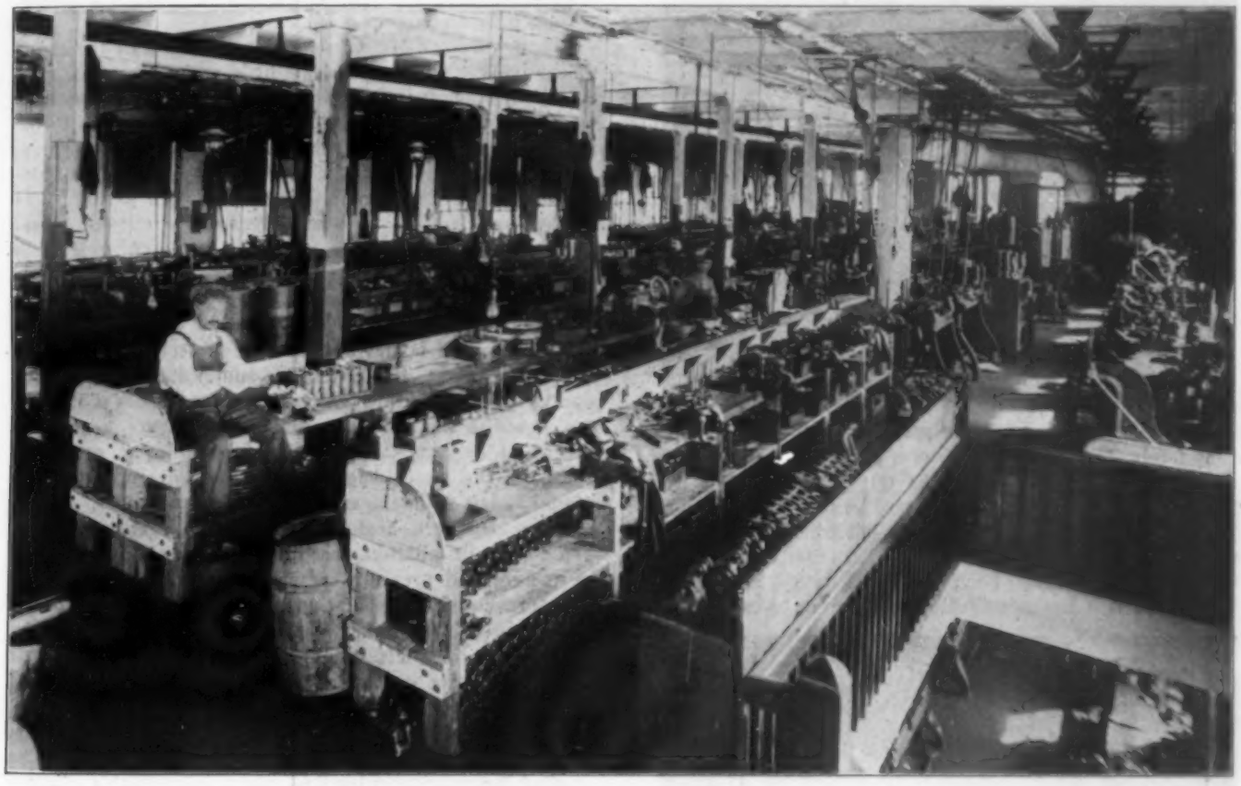
The foundry office is located next to the pattern storage, and a foundry clerk is employed to look after all of the orders on hand. By the accounting system adopted it is possible for the foundry superintendent to tell at a glance just the condition of the work in the foundry, including the progress made on each individual order, whether the orders are being executed on time or not, and how much work there is ahead of the foundry.

Between the foundry and machine shop there are located several buildings containing the power plant, a department for babbitting some of the special bearings, the case hardening department and the storage rooms. The machine shop proper is a three-story building 160 ft. x 55 ft., on the first floor, of which are located the larger machines. This floor also contains the drilling department. For convenience in handling the material about the shop or from machine to machine, special trucks, racks and tote boxes have been provided. For instance, automobile engine frames are kept in racks into which a certain number can be piled so as to take up the least possible amount of space. These racks can be moved about the shop on trucks, and when a man is operating on these castings, he takes the casting from one rack, places it in the machine, and when the operation is completed, stacks it onto another rack. In this way he is sure that all castings have been finished, and is also able to do the work with the minimum amount of handling and with the minimum amount of floor space. When the castings are finally completed the rack containing them is transported to the erecting department.

On the second floor are located some of the smaller machine tools, the tool room and the gear cutting department. As this company has always been noted as high grade manufacturers, this department is certainly worthy of notice. Among the equipment are found special milling machines, Brown & Sharpe gear cutters, Fellow's gear shapers, Gould & Ebehardt gear cutters, a Bilgram universal gear cutter, gear testing stands, and the machines which are built for grinding hardened beveled gears. They are also planning to install a Gleason universal gear cutter as soon as it is completed. The ordinary spur gears are usually roughed in a milling machine provided with a duplex cutter so as to blank out two teeth at a time. They are then transferred to a regular gear cutter where they are finished. In some of the larger steel gears three or four cuts are necessary to produce as perfect a gear as is required.

In the case of some beveled gears which have to transmit considerable power, a special tooth has been developed for the pair of gears manufactured, the object being to produce the strongest possible pair of gears for the conditions under which they must work.

Some of the turret machinery is located on the lower floors, but the majority of it is situated on the sides of the top floor. This equipment has been very carefully selected to meet requirements, and includes machines of most of the leading makers.



ASSEMBLING DEPARTMENT.

The engines are erected on special stands in the center of the top floor. The parts are made absolutely interchangeable and there are only four vises furnished for the use of the entire erecting force, as everything is supposed to come to the men ready to go together. On each side of the erecting floor proper are the assembling benches where the transmission gears and various parts of the engine are assembled, tested and prepared for the erectors.

While both the single cylinder and four cylinder engines are made, arrangement is made as far as possible to run the entire plant on one kind at a time, as this has been found more economical.

The men erecting or assembling the engines adjust all the parts so that the machine will turn over freely by hand and that the transmission gearing can be worked freely by hand.

If the foreman sees any of the erectors working at a vise, he takes notice of it, and if much time is spent at the vise

looks the matter up, for he knows that if it is necessary to spend time at the vise some parts must come to the assemblers improperly fitted.

As soon as an engine is assembled it is lifted by a duplex hoist running on an over-head trolley track, carried to the end of the room and placed upon the truck for transportation to the testing room. When the engine arrives in the testing room it is placed on a testing stand, and connected with a supply of gasoline and electricity. It is then started and run for several hours. As soon as the engine

TURRET LATHE DEPARTMENT.

runs freely it is loaded down by a brake and made to run under load for some time. The transmission gear is also tested by locking it in various positions and runnning it. The workmanship is so accurate that it has never been found necessary to run the engines by power in order to wear them down to a bearing. Each engine is tested against the brake, and if it has not developed its rated horsepower it

ENGINE ERECTING DEPARTMENT.

is returned to the machine shop, but such reports are rare. The plant has a capacity of 30 single engines per day of ten hours.

A very carefully worked out system of record blanks and cards is used throughout the entire works for keeping track of the work. The foundry costs and records are kept in the foundry office, and are so arranged that the exact condition of any order can be seen at once. This serves to prevent over running the casting orders.

BOOK REVIEW.

"Modern Gas Engines and Producer Gas Plants." By R. E. Mathot, with a preface by Dugald Clerk. New York. Norman W. Henley Publishing Co. 6¼ x 9 inches. 314 pages. 151 illustrations. Cloth. Supplied by *The Iron Trade Review* at $2.50.

In the preface to this work Mr. Clerk says: "I have read this book with much interest and pleasure, and I consider that it deals effectually and fully with all the principal detail points in the installation, operation, and testing of these engines. I know of no work which has gone so fully into the details of gas engine installation and upkeep. The work clearly points out all the matters which have to be attended to in getting the best work from any gas engine under the varying circumstances of different installations and conditions. In my view, the book is a most useful one, which deserves, and no doubt will obtain, a wide public recognition."

These words of Mr. Clerk give a true idea of the scope of the book. The author deals little with gas engine construction, the principal ideas presented dealing with operation and installation of gas engines. Various forms of the engine and the details of construction are illustrated principally by means of drawings, the author depending but little upon descriptions in this part.

The first chapter is a comparison of the cost of operation and installation of gas and steam engines. This is followed by a number of chapters on the parts of the gas engine, including the valve, method of ignition, piston, bearings, crankshafts, fly-wheels, etc. A large portion of one chapter is devoted to the subject of governors, and this might be criticised somewhat. The author speaks of the various methods of governors but does not describe what these various methods are, except by means of drawings. These drawings in some cases fail to show the exact operation of the governor and the reader is left in doubt as to exactly what it does.

Other chapters deal with automatic starting of the engine, the installation, the operation of the various types of meters and pressure regulators, and methods of piping; prevention of vibration is taken up and also the subject of exhaust mufflers. In the chapter on water circulation, various classes of tanks, together with their connections, are described as are also water coolers and the troubles due to impure water are discussed.

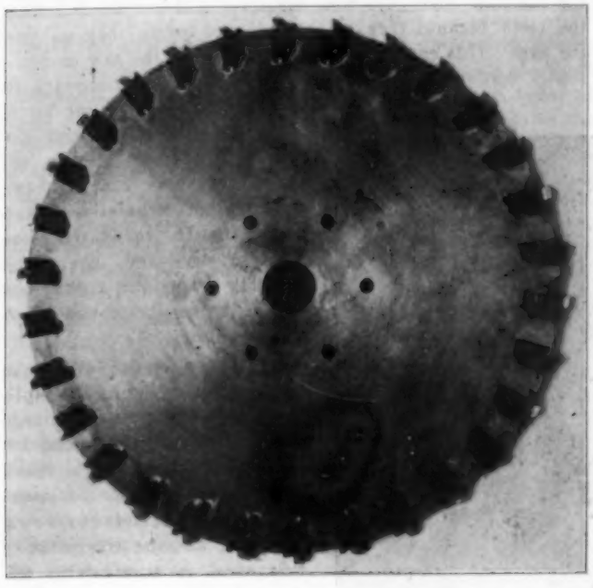
The chapter on lubrication is somewhat disappointing. The author states that it is a subject that should be studied by every gas engine user, and yet this chapter comprises less than ten pages. The remaining chapters of the book take up the precautions to be used in operating the gas engine, the conditions of perfect operation and various troubles which occur with a gas engine. The latter half of the book is devoted to the subject of producer gas. A large number of gas generators are described and illustrated, their operation being quite fully gone into. Accessories for the gas engine are described in the final chapters, including a number of types of gas engine explosion recorders, and calorimeters. A number of results of tests with various kinds of gas are also given.

The book, while it might not appeal particularly to the designer of gas engines, is a valuable one for those who are in charge of gas engines, or who are responsible for their upkeep, to possess. It tells clearly the troubles which are apt to occur and the remedies, and the solution of many perplexing problems in gas engine operation will be found in its pages.

THE TAYOR-NEWBOLD SAW*

BY MR. S. NEWBOLD.

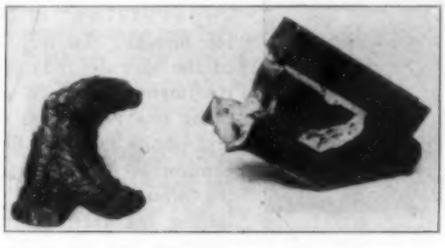
In response to a request of the secretary of this association, I am pleased to present this evening the Taylor-Newbold saw, which has aptly been described as a rotary slotter, and by all who have seen it operate, there can be no doubt that the chips produced resemble those from a heavy slotter or planing machine more than the saw dust expected from a saw. Some of the chips are shown in one of the accompany-



THE TAYLOR-NEWBOLD SAW.

ing illustrations. The saw has been referred to as a high speed saw, but high speed does not necessarily mean high cutting velocity. It refers more definitely to the results produced by the advance being made through any section of metal. This may be accomplished by a high cutting speed with a comparatively light feed, or by a very heavy feed with a slower cutting speed, and it is in the latter direction that the best results are obtained.

A great deal of attention has been given in recent years to speeds and feeds and the combination which will be most



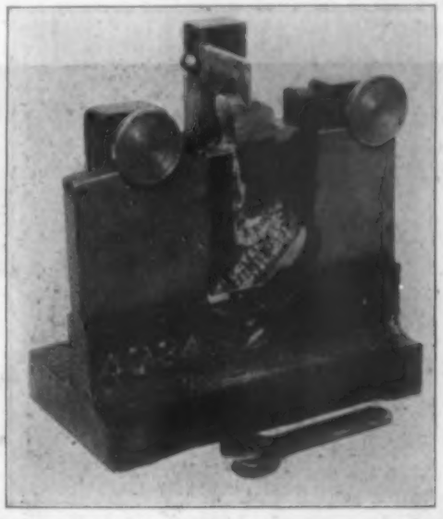
CHIPS AND CUTTER HOLDER, SHOWING HOW THE METAL OF THE HOLDER PROTECTS THE SAW WHEN A TOOTH BREAKS.

effective in removing metal; and it will generally be conceded by any one who has studied the subject that heavy feeds and slow speeds make the most rapid progress. It stands to reason that the work will be less per cubic inch of metal removed when coarse chips are produced and, therefore, less energy expended in grinding the metal to powder. This also means less surface to be traversed by the cutting edge and, hence, less wear and tear on the teeth. The form of teeth used in the saw is clearly shown in the accompanying illustrations.

*Paper read before the Philadelphia Foundrymens' Association.

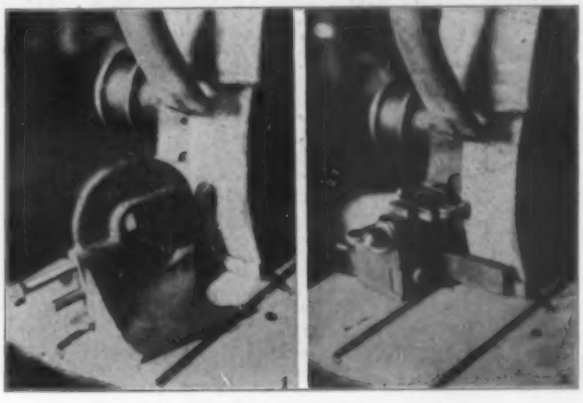
On such work as rough castings containing more or less sand, it is evident that a high speed with a fine feed rubbing against the gritty surface would grind the teeth away much faster than a heavy feed which would get beneath the sand pockets and cut away the metal more rapidly, but this coarse feed work necessitates cutting strength in the saw teeth, which is difficult to provide and which has heretofore never been so perfectly obtained as in the teeth of the Taylor-Newbold saw.

The problem has, therefore, been to design a saw with inserted teeth which should have a maximum cutting strength and a maximum resistance to abrasion. Not only this, but a saw that should provide for immediate removal of broken



GAUGE FOR SETTING TEETH.

or damaged parts in case of accident and which should protect the saw blade itself against damage so far as possible. The general construction of the saw is shown in one of the



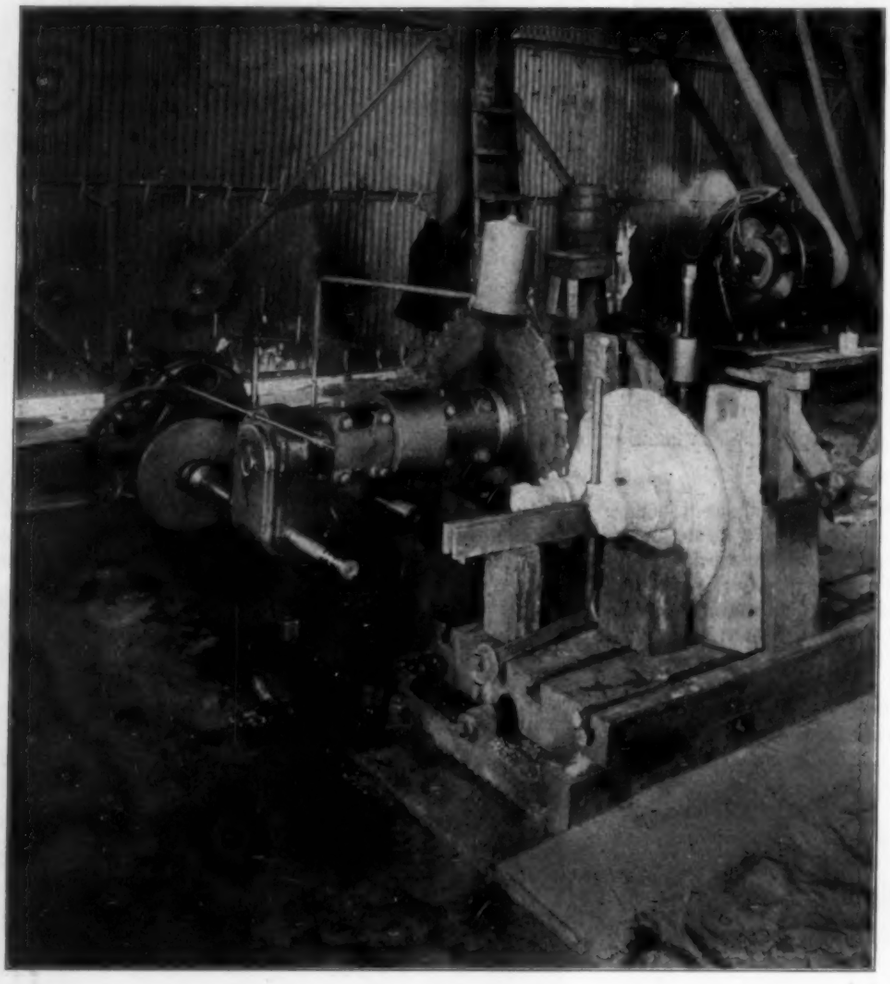
TAYLOR GRINDER FOR GRINDING CUTTERS.

accompanying views and the detached teeth are also shown. One of the accompanying views shows a holder from which a tooth has been broken and illustrates the manner in which the holder and the wedge back of it protect the saw blade from damage.

Ordinarily inserted teeth saws are not new, but have appeared in various forms for ten years. The teeth of such saws, however, have not possessed adequate strength, and the breaking of cutters is always attended with more or less damage to the saw disc. It has, therefore, been the object in the design of this saw to provide effectively against such damage, and the experience of the last few years has demonstrated that teeth may be broken repeatedly and new teeth inserted not only without damage to the saw blade

itself, but with very little delay in the operation of the saw.

The saw consists of a steel disc rather thicker than the ordinary saw and having an even number of pockets milled about the circumference, as shown in the general view of the saw. These pockets are provided with tongues to hold the inserted teeth laterally and the bottom of each pocket is milled very accurately to the same radius from the center of the saw. The teeth consist of "U" shaped holders, in which the cutters are inserted and held by casting type metal about them. The holders are provided with set screws by which the height of the cutters can be adjusted. At the back of each holder a wedge is driven to hold it securely in place. Each cutter has a solid steel bearing behind, while the space in front, which is subjected to the least pressure is filled with type metal.



TAYLOR-NEWBOLD SAW AT WORK.

A peculiar feature of the construction is that the teeth are alternately broad and narrow, the narrow teeth being set out further than the wide teeth, so as to divide the cutting approximately between the two sets of teeth.

After a tooth has been inserted in its holder and the type metal poured about it, the end of the cutter is ground by placing the holder in a special grinding chuck, as shown in the illustrations. A Taylor grinder is used and the teeth ground to exact form. By this means all of the wide teeth are ground exactly alike and all of the narrow teeth ground exactly alike.

The set screw in the bottom of the holder serves as an adjustment by which new teeth can be inserted in a saw and brought to exactly the same height as the other teeth with which they have to work. This adjusting is accomplished by means of the setting gauge shown in one of the illustrations. This gauge represents a section of the periphery of the saw and a small rider is adjusted to move over the top of the tooth while it is inserted in the gauge, thus enabling it to be adjusted to the proper height. By means of this gauge a set of teeth can be adjusted to uniform height ready for insertion in the saw, and when a change of teeth is necessary, the time required will be simply that necessary for knocking out the wedges, removing the old teeth and inserting the new ones. No time whatever will be lost in setting the teeth because they are already set before they go into the saw. This enables the operator to keep the saw in practically continuous service, whereas if it were necessary to take time to adjust the teeth in the saw itself serious delays would result. It is advisable in every case to have an extra set of cutters ground and adjusted ready for immediate use, and where the work is heavy and continuous two or three sets can be used to advantage.

It will be noticed that the cutters are of unusual depth and strength and that a large body of metal is provided for wear. The best high speed steel is used in the construction of the cutters to resist abrasion, and the treatment of this steel is particularly important, since it is desired to obtain the highest efficiency and the most satisfactory results. This treatment cannot be fully described in a paper of this character, and it will be sufficient to say that the Taylor-White process in its best and most effective form is used exclusively, the work having been installed under the personal supervision of Mr. Taylor himself. In fact, the life of the saw depends upon this treatment more than upon any other one thing, and the general public has very little conception of the care taken and the money expended in producing the teeth as perfectly as they can be made.

The saw itself may be regarded as an evolution, this general form having been first developed for the cutting of armor plate at the Bethlehem Steel Co.'s plant. Later a number of improvements were made which are now contained in the Taylor-Newbold saw. These improvements are all covered by broad patents, a number of which are still in the office.

One point to which special attention should be called is that the cutter holder and wedge interpose two pieces of metal between the cutter and the blade, so that the breaking of a cutter will not destroy the blade. Ordinarily when a cutter breaks it rolls down on to the blade behind it, but in this construction it simply mashes the soft holder. It may also injure the wedge somewhat. The set screw in the base of the holder is generally made of hard brass or bronze which

would also crush and break, thus relieving the blade from pressure in a radial direction. When a cutter is broken the holder is immediately removed and a new cutter inserted with very little delay.

Ordinarily when a tooth breaks in a solid disc saw, the feed on the succeeding tooth is doubled and it is only a question of time until the next tooth is broken also. The breaking of two teeth throws three times the weight upon the next one, which is bound to go. Hence, the breaking of one tooth means the ultimate destruction of the saw, and the only effectual remedy is to grind off all the teeth and cut new ones. It is absolutely essential for the proper working of any saw that the teeth should be uniform in height. Any departure from this throws an undue load on the teeth and tends to their ultimate destruction. In some types of inserted tooth saws, the breaking of a cutter necessitates the removal of the blade, the insertion of a new cutter and the regrinding of the saw to bring the tooth the same height as the others.

In solid disc saws it is frequently noticed that the teeth on one side only do the cutting, by reason of imperfect grinding or setting, but in such saws the feed per tooth is necessarily very fine and one-thousandth of an inch might measure the difference between active and idle teeth. With the Taylor-Newbold saw, however, each tooth has a comparatively coarse feed, the average being as much as from one to four-hundredths of an inch. Then, too, better means are provided for better setting, and this enables the maximum load to be maintained on each tooth.

Saws are ordinarily kept in stock from 6 in. to 60 in. in diameter and larger ones made to order. To give an idea of the capacity and durability we may mention that one of the 36 in. saws after running day and night for two weeks on various steel forgings cut through without regrinding a 0.35 carbon steel forging 14 in. wide and 9 in. thick in 17 minutes. Another saw 40 in. in diameter ran continuously for three months on steel castings without regrinding. We do not, however, advocate such extreme usage, as either one of these saws would have done better work if it had been ground regularly.

The tremendous cutting pressure upon each tooth of this saw requires unusual precaution in holding the work. Clamps which ordinarily hold work for solid disc saws are often inadequate to hold work against a Taylor-Newbold saw, and when the work slips nothing in the world can save the saw from buckling.

The work must be held absolutely rigid and the saw must be cared for if it is to cut evenly and if side stresses due to uneven cutting are to be avoided. Either the slipping of the work or the wearing away of one side of the teeth may cause a saw to buckle, but in legitimate service we have never experienced any difficulty whatever in this way.

These saws are used largely in steel foundries, forging shops, structural works and rail mills, but there is no reason why they should not be used in gray iron foundries, particularly where there are heavy sinking heads to be cut off, and this is our principal reason for placing such a paper before the Foundrymen's Association. Steel foundries are already interested and we hope to interest iron foundries.

An important adjunct of this saw is the Taylor grinding attachment shown in the accompanying figures, by which the ends of the teeth can be accurately ground to shape. This attachment is made for use on an ordinary wet grinder of the Northampton type.

One of the accompanying illustrations shows the saw at work cutting the risers from a steel casting.

NOTE.—When the paper was presented at Philadelphia it was accompanied by a number of lantern slides, showing various applications of the saw to different classes of machines.

WEAR OF STEEL RAILS ON BRIDGES.*

BY THOMAS ANDREWS.

A steel rail was broken in main line service on a bridge. The following investigation was made to determine, if possible, some of the causes of the breakage. The rail was made by the acid Bessemer process, and from hematite pig iron. The life of the rail was eleven years and five months. Its length was 30 ft., and the original section was of the standard bull-headed type of 90 lb. per yard, the section of rail at fracture was 82.17 lb. per yard, showing an average loss of about 0.69 lb. per yard per annum. The trains ran over the rail at an average speed of about 15 to

FIG. 1.—RAIL SECTIONS.

Original section 90 lb. per yard. | Section at fracture No. 1, 82.17 lb. per yard. | Section at fracture No. 2, 82.17 lb. per yard.

20 miles per hour, and it had not been subject to the skidding action of braked wheels. The fracture had occurred in two places; respectively 2 ft. 1 in. and 4 ft. 4 in. from the end of the rail first taking the trains. The fractures were about the same distance apart as were the two first chairs on the on-going end of the rail. It was estimated that a total of about 296,000,000 tons had passed over the track during the life of the rail or that the rail itself had borne 148,000,000 tons. The first chair was situated about 10 inches from the on-going end of the rail and the second chair about 2 ft. 6 in. from the center of the first chair. Fig. 2 shows the relative position of the chairs and fractures.

Indications point to the fact that the rail broke first at fracture No. 1 from the sudden stress of an on-coming train. At fracture No. 1 the rail had apparently been either in a wholly or partially fractured state for some time before the discovery of the final fracture. The ends of the fractured portions of the rail had apparently only been held together by the support afforded by the adjoining chairs, and by the peculiar hollowed nature manifested on the faces of each fracture, which caused the adjacent fractured faces

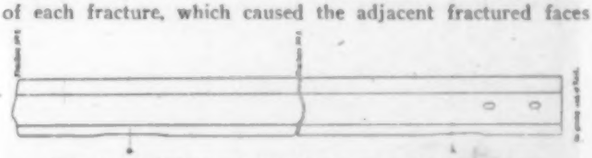


FIG. 2.—POSITION OF FRACTURES RELATIVE TO CHAIR.

Center of chair A, 10 in. from ongoing end of rail. Center of chair B, 2 ft. 6 in. from center of chair A.

to somewhat interlock with each other, and to thus resist to some extent the vertical pressure of passing trains. The rail had been reduced in vertical height by wear to the average extent of about 9-32 of an inch at the first fracture and about 8-32 of an inch at the second fracture. The rail was generally free from the fine traverse hair cracks which are sometimes found on the faces of rails which have carried heavy traffic for a long period. A few longitudinal markings in places on the rail face were found, but they were not of serious moment. The effects of weathering and corrosive action were marked on the sides of the rail and also on the underside of the rail bottom. The considerable corrosion noticed on the underside of the rail bottom was

* Abstract of a paper presented at the meeting of the Iron and Steel Institute, Sheffield, Eng., Sept. 26-29.

probably due to the local galvanic action which is excited by contact in moisture between the steel rails and the cast metal chairs. The bottom flange where it had rested in the chair was worn down about 3-32 in. by the abrasion caused by the action of passing trains. The longitudinal wear in the chair was somewhat of a stepped character instead of consisting of a gradual slope, which is a more usual development of this class of rail deterioration.

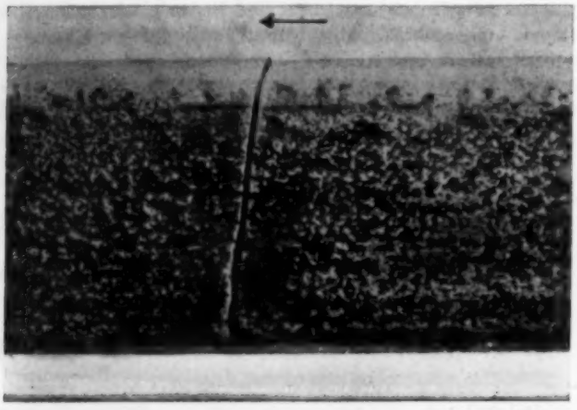


FIG. 3.—SIDE OF RAIL SHOWING FRACTURE NO. 1 AND CORROSION.

Loss of weight 0.69 lb. per yard per annum. Main line traffic weight carried by this rail 148,000,000,000 tons. Arrow indicates direction of passing trains.

The main feature of the fractured faces generally confirmed the result of the chemical, physical and microscopic examinations, and afforded visible indications of the locally varied chemical and physical structure of the rail. On the vertical face of fracture No. 2 about 1-4 in. below the rail face was a small longitudinal fissure extending axially about 1-16 in.

Depth of Corrosion Cavities in Inches.	
Rail side	Rail bottom
3-128	1-32
1-64	1-64
1-32	1-32
3-64	1-64
1-32	1-64
1-64	1-32
1-32	1-32

An examination of the rail face showed that for a length of 50 in. from the end of the rail first taking the trains the rail

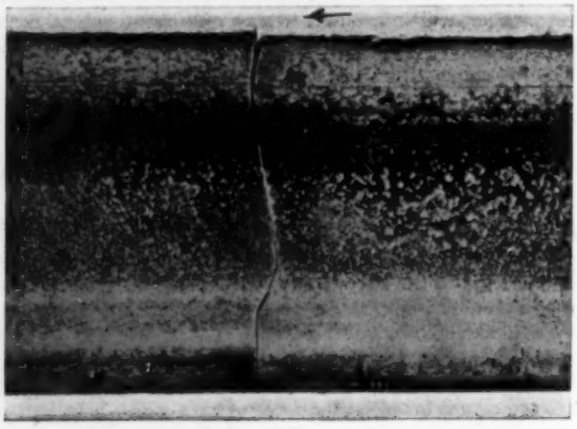


FIG. 4.—BOTTOM FACE OF RAIL SHOWING FRACTURE NO. 1.

face had not worn longitudinally in a perfectly even manner. In two places the wearing face had become depressed to a modified wave-like contour. The two depressions in Fig. 12 illustrate the positions of greatest force exerted on the rail by oncoming trains, both of which impressions were adjacent to the point of the fracture. The extent of the greatest depression did not exceed more than one-fiftieth part of an inch, but the existence of the depressions was clearly observable.

Chemical Analyses.

Drillings for analysis were taken from several positions about 6 inches from the end of the rail first taking the trains. Another series of analyses were made from drillings

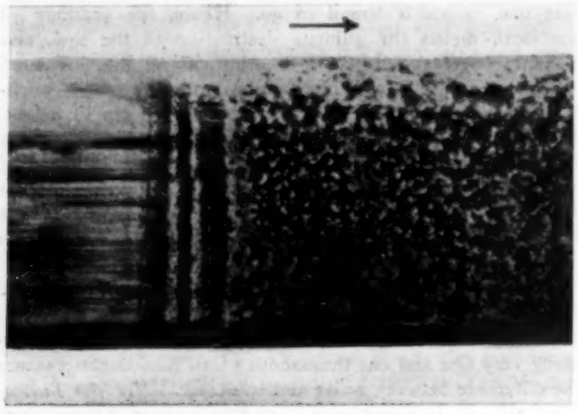


FIG. 5.—BOTTOM FACE OF RAIL AT CHAIR NEAR FRACTURE NO. 1 SHOWING CORROSION.

from identical positions in the transverse vertical section close to fracture No. 2. The analyses practically represented the chemical composition of the outer periphery of the rail head. The results of all analyses made are given in table II. On reference to this table it will be noticed that the combined carbon, sulphur and phosphorus had locally segregated to a considerable extent around the outer periphery forming the contour of the rail head. In this situation and also in the bottom flange of the rail the percentage of combined carbon was excessive for rail steel and the silicon was more than was desirable. The manganese was present in very great excess; the sulphur and phosphorus being satisfactory.

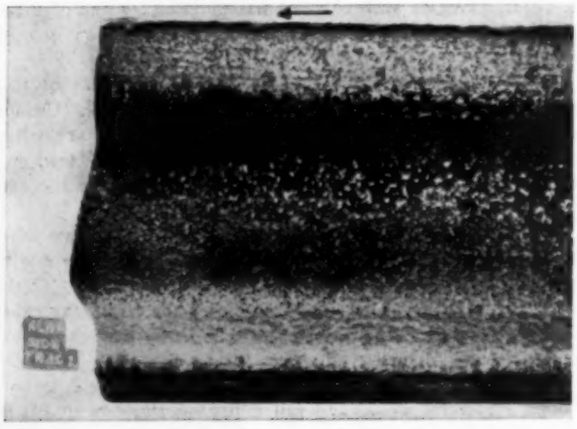


FIG. 6.—SIDE OF RAIL SHOWING FRACTURE NO. 2 AND CORROSION.

On comparing the chemical composition of the wearing surface of the rail head sides adjacent to fractures No. 1 and No. 2, with the composition of the rail at the juncture of the head with the web, in the same vertical sections, it will be seen that considerable local segregation of the chemical constituents had occurred, some of the elements having apparently, in course of the thermal treatment of the rail from the ingot to the finished state migrated outwards, and had transversely segregated at the outer surface of the rail. This produces a rail of very diversified non-homogeneous composition throughout the mass.

The non-uniformity of chemical composition is seen on referring to table 2. The rail is, in fact, a typical example of a segregated high carbon and high manganese rail, which class of rails almost invariably have a tendency to suddenly fracture in main line service. The analyses of the various parts of the rail showed that the chemical constituents are disproportionately balanced, resulting in a rail of unsatisfactory brittle nature. The confirmation of this is afforded by the results of the physical tests shown in table 3.

TABLE II. CHEMICAL ANALYSES OF THE FRACTURED RAIL.

	Column 1. Longitudinal position 6 in. from end of rail first taking the trains. Position in vertical section.				Column 2. Longitudinal position at fracture No. 1, 2 ft. 1 in. from rail end first taking the trains. Position in vertical section				Column 3. Longitudinal position near fracture No. 2, 4 ft. 4 in. from rail end first taking the trains. Position in vertical section.			
	Top of rail head	Junction of rail head with web.	Rail bottom	Approximate maximum percentage of segregation.	Top of rail head.	Junction of rail head with web.	Rail bottom	Approximate maximum percentage of Segregation.	Top of rail head.	Junction of rail head with web.	Rail bottom.	Approximate maximum percentage of segregation.
Combined carbon by coloration test	0 510	0 340	0.480	50	0.405	0.350	0.490	41½	0 520	0 330	0.430	62½
Silicon	0.086	0.078	0.088	12¾	0.093	0.080	0.095	16¾	0.097	0.086	0.088	12¾
Manganese	1.361	1.282	1.358	6¼	1.368	1 318	1.376	4½	1.413	1 334	1 441	8
Sulphur	0 077	0.040	0 071	92½	0 070	0.040	0.070	75	0.079	0 044	0.077	79¼
Phosphorus	0.074	0.043	0.067	72	0.071	0.048	0.067	48	97.813	0.046	0.075	69½
Iron by difference	97.892	98.217	97.936		97 903	98.164	97.904			0.046	98.170	
	100.000	100.000	100.000		100.000	100.000	100 000		100 000	100.000	100.000	

N. B. It may be remarked that the percentage of the combined carbon at the top of the rail head, close to Fracture No. 2 was 0.5%, and that at the side of the rail head the combined carbon was 0.46 per cent, whereas, at the junction of the rail head with the web the combined carbon will be seen to be present to the extent only of 0.32 per cent, See Column 3 in the above table.

Physical Tests of the Fractured Rail.

Portions were taken from the top of the rail head, from near the junction of the rail head with the web, and from the bottom flanges for tensile tests. The test-pieces were taken from the vicinity of fracture No. 1. Other portions were taken from near the junction of the rail head with the web, and from the bottom flange of the rail, adjacent to fracture No. 2. The result of the tensile tests shows that the rails were entirely lacking in uniformity of physical structure. The results are all shown in table III.

TABLE III. TENSILE TESTS OF THE FRACTURED RAIL.

Test Index.	Original Dimensions. Size in Inches.	Original Dimensions. Area Sq. Inches.	Distance Between Gauge Points.	Elastic Stress per Square Inch.	Ratio of Elastic to Maximum Stress percent.	Maximum Stress per Square Inch.	Elongation Percent.	Reduction of Area Percent.	Remarks.
			Inches.	Tons.		Tons.			
1T	0.564	0.250	2	28.02	59.9	48.32	4.0	5.2	Very finely granular.
1J	0.564	0.250	2	22.12	54.7	40 44	30.0	59.2	Silky fibrous.
1B	0.564	0.250	2	32.68	56.1	58.24	8.0	8.4	Very finely granular.
2T	0.564	0.250	2	27.84	53.1	52.52	1.50	24.4	Finely granular with a trace fibrous
2J	0.564	0.250	2	22.40	55.1	40 60	29.0	59.2	Silky fibrous.
2B	0.564	0.250	2	33.76	70.5	47 88	3.0	5.2	Very finely granular.

Test index 1T was taken from the top of the rail head at fracture No. 1.

Test index 1J was taken from near the junction of the rail head with the web, about 1½ in. below the rail face, adjacent to fracture No. 1

Test index 1B was taken from the bottom flange of the rail at fracture No. 1.

Test index 2T was taken from the top of the rail head at fracture No. 2.

Test index 2J was taken from near the junction of the rail head with web, about 1½ in. below the rail face, adjacent to fracture No. 2.

Test index 2B was taken from the bottom flange of the rail at Fracture No. 2.

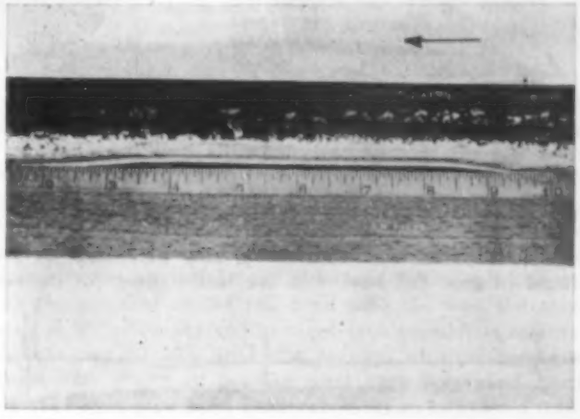


FIG. 7.—SIDE VIEW OF BOTTOM FLANGE SHOWING WEAR OF RAIL BOTTOM IN CHAIR.

The maximum stress near the top of the rail had at fracture No. 1, was very high and elongation extremely low.

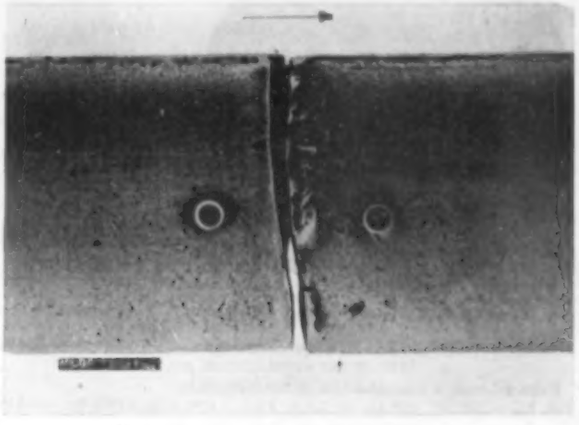


FIG. 8.—RAIL FACE SHOWING FRACTURE NO. 1.

The physical properties of the rail at this point were but little removed from the properties of cast metal. Lower

down in the vertical section, near the junction of the rail head with the web, the physical properties were locally entirely different from those near the top of the rail head. At this point the maximum stress, elongation and the reduction of area were satisfactory, and were such as are found in good rail steel. In the bottom flange of the rail the maximum stress was extremely high and far beyond what is desirable in good rail steel; the elongation was very poor as was also the percentage of the reduction of area.

The maximum stress at the top of the rail head adjacent to fracture No. 2 was much higher than is desirable for good rail steel; and the elongation was low. The physical properties at the junction of the rail head and web were of a satisfactory nature and of a character of the structure of good rail steel. In the bottom flange of the rail the maximum stress was high and the elongation was extremely low. At this point the rail was not much better than cast metal.

(Fig 9)

(Fig. 10)

(Fig. 11)

FIG. 9.—FACE OF FRACTURE NO. 1. AS SEEN IN OPPOSITE DIRECTION OF PASSING TRAINS.

FIG. 10.—FACE OF FRACTURE NO. 1 AS SEEN IN THE DIRECTION OF PASSING TRAINS,

FIG. 11.—FACE OF FRACTHRE NO. 2 AS SEEN IN OPPOSITE DIRECTION OF PASSING TRAINS.

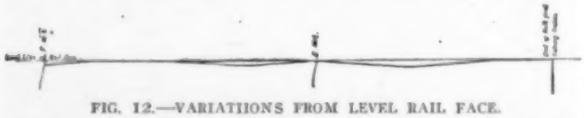
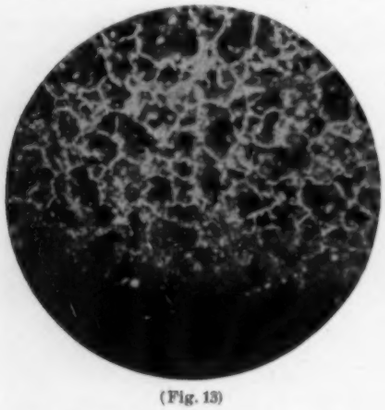


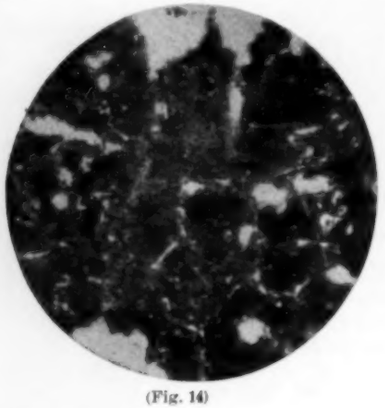
FIG. 12.—VARIATIIONS FROM LEVEL RAIL FACE.

Variations are in a length from 15 in. from rail end first taking the trains. Horizontal scale 1-5 natural size. Vertical scale 2 7-16 times natural size. F. No.1 and F. No. 2 are points of fractures.

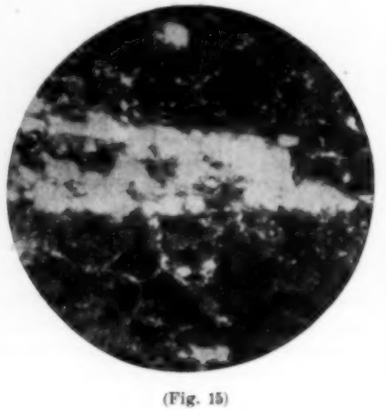
These results show that the segregated condition of the chemical elements in table II. materially affected the physical structure of the rail and resulted in a rail of brittle character. There was no homogeneity of physical structure throughout either the vertical or longitudinal section of the rail. This lack of uniformity the author considers due to the very high percentage of combined carbon and manganese which prevailed in the rail head and bottom flange. The chemical analyses and the high power microscopic examinations confirm the results obtained by the physical tests, and indicate the undesirability of using rails of a high percentage of combined carbon and manganese, even though comparatively free



(Fig. 13)



(Fig. 14)



(Fig. 15)

FIG. 13.—LONGITUDINAL SECTION, RAIL FACE, SHOWING SEGREGATED STRUCTURE AT FRACTURE NO. 1.

Reduced from a magnification of 250 diameters.

FIG. 14.—LONGITUDINAL SECTION, RAIL FACE, SHOWING SEGREGATED STRUCTURE AT FRACTURE NO. 1.

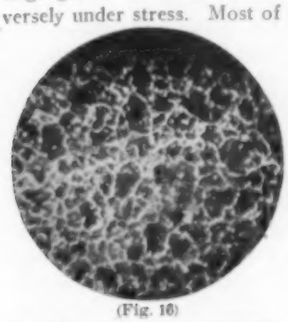
Reduced from a magnification of 250 diameters.

FIG. 15.—TRANSVERSE SECTION RAIL FACE AT FRACTURE NO. 1.

from excess of sulphur and phosphorus.

High Power Microscopic Examinations.

A high power microscopic examination was made of the crystalline structure of the rail. A portion was taken from the rail head close to fracture No. 1. The section was properly shaped and polished and afterwards etched in suitably dilute acid to develop the micro-crystalline structure of the rail face, as seen in longituinal section. The longitudinal micro-crystalline structure of the rail face was of an unsatisfactory nature and showed a brittle segregated formation and one liable to fracture transversely under stress. Most of the individual crystalline grains



(Fig. 16)

(Fig. 17)

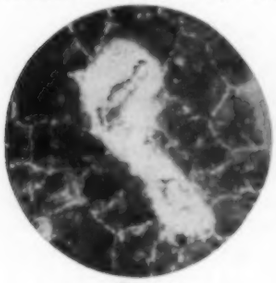
FIG. 16.—TRANSVERSE SECTION 0.02 INCH BELOW RAIL FACE AT FRACTURE NO. 1.
Reduced from a magnification of 100 diameters.

FIG. 17.—TRANSVERSE SECTION 0.25 INCH BELOW RAIL FACE AT FRACTURE NO. 1. SHOWING INTERNAL MICRO-FLAWS.
Reduced from a magnification of 250 diameters.

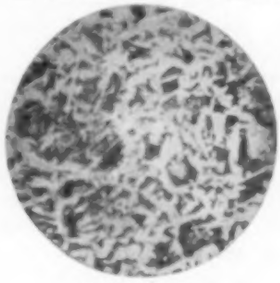
of the ferrite were of an irregular shape and character; there were considerable segregated areas of gray carbide of iron, and large isolated patches of ferrite. The general crystalline structure of the wearing face of the rail was of an undesirable type and such as is characteristic of brittle high carbon and high manganese steel rails.

A micro-section of the top of the rail head. in transverse section, adjacent to the longitudinal micro-section above described, was also prepared, polished and etched to show the micro-crystalline structure, as seen in transverse section at the edge of the wearing face and at varied distances in the vertical transverse section below that position.

High power microscopic examinations of the transverse vertical structure were made on the line of the wearing



(Fig. 18)



(Fig. 19)

FIG. 18.—TRANSVERSE SECTION 0.25 INCH BELOW RAIL FACE AT FRACTURE NO. 1, SHOWING INTERNAL MICRO-FLAWS.
Reduced from a magnification of 250 diameters.

FIG. 19.—TRANSVERSE SECTION, INSIDE AREA NEAR JUNCTION OF RAIL HEAD WITH WEB AT FRACTURE NO. 1.
Reduced from a magnification of 250 diameters.

face of the rail at 1-100 in. beneath the wearing surface, at 1-50 in. beneath the wearing surface and at ¼ in. and at various distances down to a total of ½ in. below the rail face.

There was no marked alteration of crystalline structure observable in the transverse section ¼ in. below the rail face at fracture No. 1. This section manifested throughout the large grain crystalline formation usually typical of high carbon and high manganese steel rails. Similar microscopic examinations were made at a vertical distance of about 1½ in. above the wearing face of the rail, and in the same longitudinal axial line from which the chemical and physical tests were taken, described in tables 2 and 3 as "Junction of rail head with Web." In this position the crystalline structure was of a different character from that found at the top of the rail head, the crystalline grains being of a smaller formation and characteristic of a better quality of steel rail. There were, however, in places, indications of the lattice-like mesh-work crystalline formation characteristic of ingot structure.

(Fig. 20)

(Fig. 21)

FIG. 20.—TRANSVERSE SECTION, RAIL HEAD AND WEB JUNCTION AT FRACTURE NO. 1, SHOWING INTERNAL MICRO-FLAWS.
Reduced from a magnification of 250 diameters.

FIG. 21.—TRANSVERSE SECTION RAIL HEAD AND WEB JUNCTION AT FRACTURE NO. 1.
Reduced from a magnification of 100 diameters.

The author thinks that there are indications that the ingot had been maintained in a heated condition for some time before rolling. The micro-sections of the rail head, both longitudinal and transverse, visibly demonstrated that a decided segregation of some of the chemical constituents had occurred and that there was an excessive concentration of combined carbon and some other elements in the top of the rail head and in the rail bottom. At the junction of the rail head with the web the steel was of better quality and of more even crystalline texture. In the top of the head the carbide of iron areas or crystalline grains of pearlite were very large and most of them were isolated from their neighbors by a thin lattice-like surrounding mesh-work of ferrite, a structure which is indicative of a tendency to weakness and brittleness. The micro-crystalline structure near the junction

(Fig. 22)

(Fig. 23)

FIG. 22 & 23.—MICROSCOPIC EFFECT OF COMPRESSION.
Rail face polished and compressed 5 per cent of original size, showing development under stress of crystalline slip and fine transverse fissures starting from longitudinal microflaws of sulphides or other impurities near Fracture No. 1. Compressive stress applied in the direction from top of cut to bottom.

of the rail head with the web was of a smaller type.

General Remarks.

1. As previously stated the weight borne by the rail had been 148,000,000 tons. The rail had therefore endured a considerable amount of work previous to its fracture. The loss in weight, 0.69 lb. per yard per annum, was above the normal wear of good steel rails. This loss was higher than has been observed in the case of old rails having a

medium percentage of combined carbon and manganese, and which have endured the main-line traffc of some of the chief railways in England for periods varying from eighteen to twenty-four years.

2. The two fractures were mostly of a short brittle character, the wearing face being in fair condition, though there had been considerable external, corrosive action, on the sides of the rail but more especially under the bottom flange where the rail had rested in the chairs.

3. The author considers that, amongst other contributory causes, one of the chief causes of the fracture has been the defective segregated chemical composition of the rail and to the fact that the combined percentage of carbon and manganese found in the top of the rail head and in the bottom flange were in excess of what should obtain in good rail steel.

4. The condition of local segregation of the chemical constituents in the vertical section has caused an inequality of physical mass structure which has materially reduced the resisting strength of the rail to the vibratory shocks of prolonged wear; this non-uniformity of physical structure is due to the unevenly balanced nature of the chemical composition of the rail.

5. The results of the physical tests have demonstrated that the upper portion of the rail head and also the bottom flange were of a hard and brittle nature, whereas near the junction of the rail head with the web, physical properties were of an entirely different nature, there being an entire lack of uniformity of physical structure throughout the mass of the rail.

6. The high power microscopic examinations have confirmed the result arrived at by the chemical analyses and physical tests, and they have visibly demonstrated the non-uniformity of the physical and crystalline structure of the rail.

The microscopic examinations have also shown the undesirability of employing rails having too high a percentage of combined carbon and manganese, and they also indicate that great care should be exercised in the thermal treatment of rails from the ingot to the finished rail, in order to obtain a suitable micro-crystalline structure resulting in a good durable rail.

With regard to the cause of external local segregation in steel rails it has been demonstrated that local internal segregation mostly exists in those rails which represent the top part of an ingot. During the cooling of large steel ingots, in addition to a local segregation near the top of an ingot, there may be sometimes a further transverse migration of carbon and other elements from the central axial part towards the exterior of the ingot. This tendency to external migration of the chemical elements the author considers is most likely to occur near the bottom or wider part of the ingot. When such an ingot is rolled into a rail which is finally cut into 30 feet lengths that rail representing the bottom of the ingot is likely from the above cause to manifest a condition of local external segregation, whereas the rail representing the top portion of the ingot would probably afford indications only of internal axial segregation. The author considers further that the keeping of steel ingots for any lengthened period in soaking pits tends to promote local segregation of some of the chemical constituents.

The results of the investigation indicate the importance of keeping the chemical composition of rails within the limit of such a chemical specification as will produce the best results in actual wear, and minimize the liability to sudden fracture.

Suggestions.

1. The author considers that the rail web in the original section is too thin in proportion to the section of the rail the web being 21.32 inches thick. He recommends that in rails of this type the web should not be less than ¾ inch thick, and the rail head, he considers, might be advantageously increased to not less than 2 5-8 inches. The bottom flange should be proportionately increased.

2. The author thinks that a heavier section of rail than that under examination should be used for bridge and tunnel traffic. For bridge work he would recommend a wide flat-bottomed rail of heavy section, as he believes that this type of rail on longitudinal sleepers would yield more reliable results in main-line traffic for bridge or tunnel service than the ordinary bull-headed type of rails resting on chairs. If the bull-headed rails with transverse sleepers are employed it is desirable to have in tunnels or on bridges a greater number of sleepers placed nearer together, and also to have specially large sleepers beneath the fish plate joints at the end of the rail. In case rails of a heavier section are used, it is important that the ingot from which they are rolled should have a proportionately increased transverse sectional area, to insure that a proportionately increased amount of rolling work is put on them. Merely lengthening the ingot to get the increased weight in section does not allow of equal work being put on the finished rail, as compared with the rails of less section.

3. The author regards it as important that the chemical composition and physical tests of rails should practically be kept within such limits as to insure uniform micro-crystalline structure, chemical composition, and physical properties, such as are best capable of permanent indurance, and which at the same time are calculated to minimize liability to sudden fracture under the stress of main-line wear.

4. In view of the considerable corrosive deterioration of rails on bridges and in tunnels it might be advantageous to protect such rails primarily by giving them two or three coats of good paint.

5. The railway companies on their own behalf should have regular and frequent chemical analyses and physical tests made of samples of new rails after they have been received from the makers, and the analyses should be made on the finished rail and not on the ingot, prior to the rolling of the rail.

Virginia Iron Ore Lease.—The closing up of a lease of 50,000 acres of iron ore properties in Potts' Creek Valley, Va., the *Manufacturers' Record* declares, "means more to the development of the iron-making industry of the upper South than any move that has been made in recent years. As a result of the lease, the Chesapeake & Ohio Railroad will at once begin the construction of a line about 30 miles long, extending from Covington, Va., into Potts' Creek Valley, to a junction with the Norfolk & Western Railway, which will have 45-mile line running into the valley from a point on its New River branch, near the mouth of Stony Creek, the Norfolk & Western having recently purchased the Stony Creek line, which it will rebuild and extend. By the terms of the lease the 50,000 acres are divided in practically equal parts between the Lowmoor Iron Co. and the Virginia Coal, Iron & Coke Co. The Lowmoor company gets the northern portion which is contiguous to the Chesapeake & Ohio, while the Norfolk & Western touches the southern part." It is understood that the length of the lease is to be 40 years, with a minimum production of 500,000 tons a year and a minimum royalty of $100,000. Virginia furnaces experience great difficulty in securing an adequate ore supply. This ore is a brown hematite, running from 44 to 60 percent, can be worked alone and occurs in regular, well-defined veins of good thickness.

Newly Elected Officers of The Lake Superior Mining Institute.

JAMES MACNAUGHTON, PRESIDENT, CALUMET, MICH.

A. J. YOUNGBLUTH, SECRETARY, ISHPEMING, MICH.

F. A. VOGEL, MANAGER, FLORENCE, MICH.

J. R. THOMPSON, DIRECTOR. IRONWOOD, MICH.

E. W. HOPKINS, TREASURER, COMMONWEALTH, MICH.

METHODS OF ANALYZING ORE.*

BY W. A. SIEBENTHAL.

The idea of compiling the methods used in the laboratories of the iron mining companies of the Lake Superior district, in the analysis of iron ores was suggested by the work of Francis C. Phillips, "Methods for the Analysis of Ores, Pig Iron and Steel," published by the Engineers' Society of Western Pennsylvania, 1896, and later in book form by the Chemical Publishing Co.

The plan therein carried out has been followed in our present work. A letter was addressed to each of the chemists, whose name and address we were able to obtain, requesting a description of the methods used in the analysis of iron ores in the determination of iron, phosphorus and such other substances as might be determined. The responses were quite general, but few of those addressed failing to send in a description of the methods employed.

In submitting this collation of methods we, the chemists of the district, hope that such may be of some interest to mining men and chemists in general and of special interest to the chemists of the Lake Superior region. The intention is not to present a scientific treatise on iron ore analysis, but to set forth in detail the methods of procedure carried out in the daily work in the analysis of iron ores, which furnishes the basis for the grading of the ores and the commercial transactions of the mining companies.

Because of the limited time allowable for analysis, the accuracy and reliability that results must present, we believe that in the Lake Superior district the methods employed are as rapid and at the same time as reliable as may be found in use, in any section, in the commercial analysis of iron ores. That the present compilation is in many respects crude and imperfect we are well aware. We desired and attempted to reach all the chemists of the region and wished to give all an opportunity to contribute to the work. No doubt some may have been missed and to any such we can say that we would be pleased to hear from any who may have something to submit before the final publication of the paper in the proceedings of the institute next year. Doubtless there are some who have worked up some methods that at present they do not care to give out. However, because of the general responses to our letter and of the geographical distribution of the same we feel that the present attempt at compilation fairly represents the present status of analytical chemistry of iron ore analysis of the district.

The reports coming from the chemists of the different mining sections are distributed as follows: From Minnesota five, representing the Vermillion and Mesabi ranges, from the Gogebic range six, from the Menominee range five, from the Crystal Falls district two, from Marquette county three, from the Baraboo district, Wisconsin, two, and from Ontario one; in all 24. From the descriptions of methods submitted and which it is expected will be issued in pamphlet form in the near future I find the following general data.

Two methods are in general use in the determination of iron: One, the permanganate method, familiar to most of us, is used by 17 chemists; the other, the bichromate method, by but seven.

In the determination of phosphorus three general methods are described with varying modifications in manipu-

*Paper read at the meeting of the Lake Superior Mining Institute, Oct., 1905.

lation. One, the Handy alkalimetric method, in which the phosphorus is precipitated as yellow ammonium phosphomolybdate, dissolved in standard sodium hydrate, and titrated with standard nitric acid is used by 20 of the chemists; the Emmerton method, in which the yellow precipitate is dissolved in ammonium hydrate, reduced with zinc and sulphuric acid and titrated with potassium permanganate is used by three; and a modification of the Wood method, described in "Blair's Chemical Analysis of Iron," in which the phosphorus is determined gravimetrically by weighing the yellow ammonium phosphomolybdate precipitate, is used by one of the chemists. In some instances two methods are reported by some of the chemists.

Two methods of more than usual rapidity are described, one by Mr. John McNamara, of Ironwood, the other by Mr. F. A. Janson, of Vulcan, Mich., both being modifications of the Handy method. In the determination of silica two methods are described, the sodium carbonate fusion method is used by seven; the hydrofluoric acid method by four, both being used by some of the chemists. Volhard's method for manganese, with various modifications, is used by 14 of the chemists; Julien's method by one; and a gravimetric process is described by one. Of those reporting methods for the determination of calcium, ten use a gravimetric method, precipitating the calcium as calcium oxalate; igniting and weighing as calcium oxide (CaO). One uses a volumetric process, titrating with potassium permanganate. Magnesia is determined gravimetrically as magnesium pyrophosphate by six and alumina as aluminum phosphate by nine of the chemists who report methods for such determinations. Sulphur is determined as barium sulphate by those reporting on the determination. One chemist describes a method for the determination of titanium. Methods for moisture determination are described by four and for organic and volatile matter by three chemists.

The interest and value of this collation of methods to the chemists of the district, it seems to me, lies in and is to be obtained from the differences in details and manipulation as well as in the general differences of methods. Already have I found myself making some changes in my own work, applying some of the details given by some of the chemists in their descriptions.

In conclusion, while the methods described may be as rapid and reliable as any in general use, it seems to me that there is a possibility for improvement and an excellent opportunity for research along the line of both shortening and simplifying some of the methods given, especially in the determination of phosphorus.

A method for the direct oxidation and dissolving of the phosphorus, without the complete solution of the ore would greatly simplify the process. The two methods given for the determination of iron are quite simple, when compared to those described for other substances, yet each has certain objections; the permanganate method because of the inconstancy of strength of the solution; the bichromate method is slower and requires the use of an external indicator.

An internal indicator would be a decided improvement in the bichromate method. Keeping the permanganate solution under some gas rather than in contact with the air might remedy the objection to the permanganate method.

We are indebted to Mr. D. T. Morgan and Mr. Wm. Kelly for courtesies and aid extended in the preparation of the work and also desire to thank the other superintendents and general managers who have co-operated in the work in furnishing us with the names and addresses of their chemists or who referred our letter of inquiry to the chemist in charge of the laboratory work.

MINING INSTITUTE'S NEW MEMBERS.

The following are the new members of the Lake Superior Mining Institute, elected at the recent annual meeting held on the Menominee Range in October.

Aishton, R. H., asst. gen'l mgr. C. N. W. railway, 215 Jackson boulevard, Chicago.
Bauder, W. Ralph, mng. engineer, Ishpeming, Mich.
Baxter, Charles Homer, mng. engineer, Iron Mountain, Mich.
Broughton, Henry Primm, gen'l mgr. G. N. Great Northern Power Co., Providence building, Duluth.
Crain, Fred W., chemist, Commonwealth, Wis.
Chamberlin, H. L., superintendent, Florence, Wis.
Carson, John A., manufacturer, Appleton, Wis.
Clark, Horace S., salesman Macomber & White Rope Co., 21 S. Canal street, Chicago.
Clifford, I. N., supt. St. Paul ore dock, Escanaba, Mich.
Clemens, John, mng. captain, Ironwood, Mich.
Cornell, Norman I., broker, 106 Front street, Ishpeming, Mich.
Cundy, H. I., supt. Iron Ridge mine, Iron Mountain, Wis.
Davidson, Ward F., student, Iron Mountain, Mich.
Driscoll, Cornelas B., supt. crusher plant, Negaunee, Mich.
Dean, Dudley S., treas. Keweenaw Association, 37 Milk street, Boston.
Earling, H. B., asst. gen'l supt. C. N. W. railway, Milwaukee, Wis.
Favor, Geo. Warren, representing Sullivan Machinery Co., Railway Exchange, Chicago.
Fay, Joseph, livery and contractor, Lake street, Marquette, Mich.
Frazer, Wm., asst. supt. Corrigan-McKinney Co., Crystal Falls, Mich.
Feushere, Leon, geologist, Ishpeming, Mich.
Fox, John Murry, mng. engineer, Ishpeming, Mich.
Frangquist, mng. captain, Crystal Falls, Mich.
Getchell, Frank H., clerk Mohawk Mng. Co., Mohawk, Mich.
Gow, A. M., asst. chief engineer Oliver Iron Mng. Co., Wolvin, Duluth.
Harrison, S. N., supt. Wis. & Mich. railway, Prestigo, Wis.
Harrison, G. E., supt. Stevenson Iron Mng. Co., Hibbing, Minn.
Hearley, Michael T., sec'y Great Western Oil Co., Cleveland.
Hitchens, John H., chemist Chapin mine, Iron Mountain, Mich.
Huntoon, Harry A., asst. master mechanic, Ishpeming, Mich.
Jensen, M. C., cashier, Commonwealth, Wis.
Jones, Jno. T., mine operator, Iron Mountain, Mich.
Jones, A. G., mine supt., Iron Mountain, Mich.
Jones, E. W., mine supt., Iron Mountain, Mich.
Knight, I. B., editor, Norway, Mich.
Larson, Edward, captain, Florence, Wis.
Look, Wm. F., dock agt. C. & N. W. railway, Escanaba, Mich.
Maas, Wm. J., mng. manager, Negaunee, Mich.
Medurmott, Henry, mine supt., Iron Mountain, Mich.
Mead, Frank D., lawyer, Escanaba, Mich.
Mills, John, mgr. New York Belting & Packing Co., 150 Lake street, Chicago.
McClure, O. D., master mechanic C. C. I. Co., Ishpeming, Mich.
McGregor, Silas J., supt. Millie Mine, Iron Mountain, Mich.
Nelson, L. T., supt. Sullivan Machinery Co., Chicago.
Pattberg, Otto, mng. engineer, Florence, Wis.
Penton, John A., publisher *The Iron Trade Review*, Cleveland.
Quine, John T., mine inspector, 413 Vine, Ishpeming, Mich.
Rumsey, Spencer S., mechanical engineer, Wolvin bldg., Duluth.
Salomson, H., forman carpenter, Aragon mine, Norway, Mich.
Soday, Harry, salesman, Iron Mountain, Mich.
Swain, Richard A., agt. Gen'l Electric Co., Duluth, Minn.
Tufts, John W., salesman Goodyear Rubber Co., Milwaukee, Wis.
Tripp, Chas. P., metallurgical engineer, Monadnock blk., Chicago.
Tarr, S. W., civil engineer, Wolvin bldg., Duluth, Minn.
Townsend, C. V. R., asst. land agt. C. C. I. Co., Negaunee, Mich.
VanVolkenburg, Allen J., supt. W. C. railway, Abbottsford, Wis.
Wagner, John M., purchasing agt. Copper Range Cons. Co., Houghton, Mich.
Wells, Pearson, mng. engineer, St. James hotel, Ironwood, Mich.
Whitehead, R. G., shift boss, Amasa, Mich.
Wilkins, William, mng. Ashland Iron Steel Co., Ashland, Wis.
Winegar, Chas. T., lawyer, Iron Mountain, Mich.
Witherbee, F. S., vice pres. Tennessee Coal & Iron Co., Port Henry, N. Y.
Youngs, George C., editor, Florence, Wis.

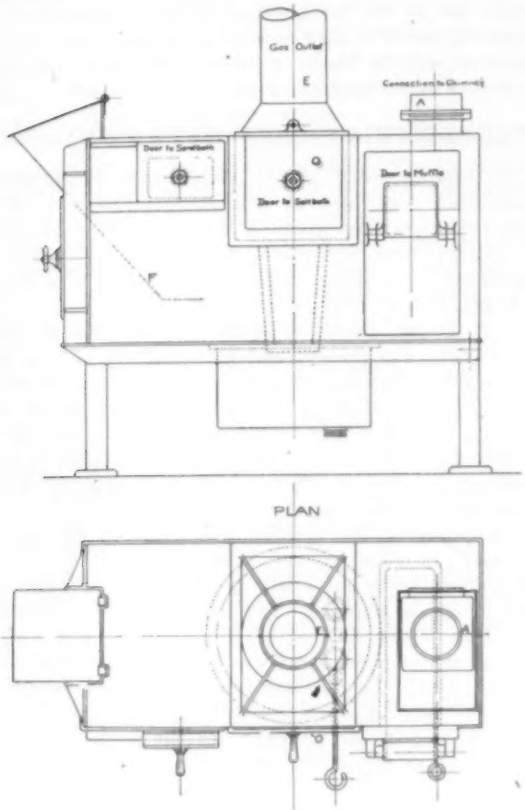
Dominion Company's Plans.—The Dominion Iron & Steel Co. has commenced work on an order for 5,000 tons of steel rails for the Temiskaming & Northern Ontario Railway and is also filling the order of the Intercolonial for 25,000 tons. The company has in contemplation the addition of more modern machinery to its open hearth plant in order to enlarge the output. C. H. MacMillan, late superintendent of the open hearth plant at Ensley, Alabama, where a similar class of ore is used, has been making a preliminary inspection of the plant in view of the change. Arrangements are being effected with the Nova Scotia Steel Company for the exploration of submarine ore areas at Wabana, further out than those of the Dominion Co.

Professor John E. Sweet, in estimating the value of a trade to a young man, thinks that the man who has just acquired the trade has something that is equal at least to $6,000 in cash, which will yield at five percent an annual income of $300. Then too, he might lose the money, but he cannot lose the trade.

A GERMAN FURNACE FOR MELTING LEAD OR SALT FOR HARDENING STEEL.

BY ROBERT GRIMSHAW.

The furnace illustrated herewith is for the purpose of melting lead or common salt, used for steel hardening. The pot is a steel casting 350 mm. deep and 150 mm. in diameter; and there is also a muffle of tiles 400 mm. long, and 150 mm. wide and high. This muffle, which is at the right of the melting pot as seen in the illustration, is intended to heat the articles to about 150 to 200 degrees C., corresponding to a so-called "black heat;" so that they need not be plunged into the melted material in a cold condition. This is an important feature of this make of furnace, as the placing of cold tools in the melted salt or lead is apt to cause sputtering



FURNACE FOR MELTING LEAD OR SALT.

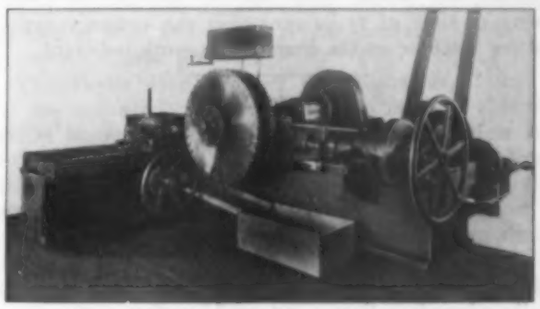
and splashing about of the hot material, which is uncomfortable if not dangerous to the workman. A further advantage of this preheating is, that the capacity of the furnace is thereby increased. The gases of combustion arising from the grate F first surround the melting pot, then heat the muffle, which naturally calls for less heat than the melting pot, in their passage past A, to the chimney. The melting pot is accessible through the opening O in the front side of the furnace, which opening is closed by a counterbalanced door. Above the pot there is a hood B, with a connection to the chimney, if desired. At the left side of the melting pot there is a second muffle chamber, partly surrounded by the gases of combustion, and which serves as a sand bath for drawing the temper.

The maker of the furnace is Hermann Pekrun, Coswig, Saxony.

The Pilling Air Engine Co., Detroit, Mich., is working night and day shifts in an endeavor to keep up with its orders. It finds the demand for its various sized hoists and its turn-table device about equal.

DOUBLE ROTARY SLOTTING MACHINE.

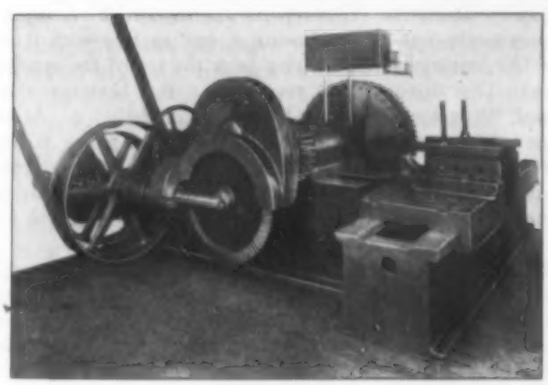
The High Duty Saw & Tool Co., Eddystone, Pa., have recently built for the Paterson, N. J., plant of the American Locomotive Co., a tool for slotting connecting rods, open end links, crank shafts and for doing similar work. This tool is shown in the accompanying illustra-



FRONT VIEW DOUBLE ROTARY SLOTTING MACHINE.

tions. It was primarily intended to slot out open ended locomotive connecting rods, the straps for these rods, the jaws of the eccentric rods and cross heads. The principle of the machine is that of a continuous cut in place of the reciprocating stroke of the ordinary type of slotting machine. No time is lost in the return stroke of the tool, a steady uninterrupted cut being substituted. The cutting tools are two "Tindel" high-duty inserted tooth saw blades. These blades are 36 in. in diameter, 3/8 in. thick and have 76 teeth each. The machine is heavily constructed and is especially designed for heavy work. Fig. 1 is a front view of the machine showing the cutting tools and vise for clamping the work. Fig. 2 is a back view of the machine showing the drive. The main drive, instead being of the usual worm and wheel type is of the spur and bevel gear type. The use of this drive eliminates a large loss of power in friction.

The carriage carrying the saw arbor is square locked in front and is tapered on the back side. All wear is taken up on heavy phosphor bronze shoes. The arbor itself is a 0.60 carbon steel forging of large diameter and long bearing. The feed is by means of rolling friction



BACK VIEW DOUBLE ROTARY SLOTTING MACHINE.

discs. An automatic adjustable and positive throw out is used in conjunction with the feed.

By the insertion of washers of varying calculated thicknesses the saw blade can be separated to any width up to 8 in. and a corresponding slot obtained. Locomotive work usually does not require a wider slot than this but

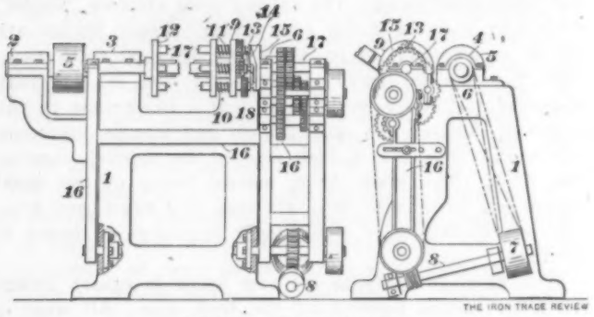
if desired the cutters can be separated far enough to meet any requirement.

The machine has two tables which are adjustable to work separately or together. Gearing below the tables provide a method of setting work to the line by means of a hand wheel movement, which is shown in Fig. 1. The tables are provided with V blocks, straps and bolts for attaching the work. This machine has accomplished a saving of time of 75 percent over the ordinary type of slotting machine on the character of work indicated.

Multiple Lathe.

A multiple lathe, invented by Ingebert Assland is illustrated herewith. This invention has reference more particularly to wood-turning machines into which bars or blocks of wood, previously sawed, usually into similar rectangular prisms, are fed one after another and automatically picked up by the mechanism, presented to formative cutters that are in rapid rotation, and, having received the shaping intended, are finally released or thrown out, enabling the parts concerned to seize another piece of wood, upon which the operation is repeated.

The principal object of this invention is to provide co-operating gears moving at definite speed with respect to each other by means of which each lathe-spindle will be rotated at a predetermined rate and the entire system of spindles revolved independently of the spindle rotation and at a variable rate of speed. Another object is to provide a multi-spindle lathe in which the spindles and gearing men-



MULTIPLE BLOCK LATHE.

tioned are borne by a pivoted frame movable toward and from the cutter-shaft.

In the accompanying illustration, 1 designates the machine stand by which the various parts are supported. A bracket supports the out-board bearing 2, and in line with it are two like bearings 3 and 4, rising from the top of the machine stand. The driving-shaft revolves in the bearings mentioned, being turned by suitable belting on pulley 5. At the right-hand extremity of the shaft is a belt-pulley 6, and the broken lines indicates the belting, which twists slightly as it runs, connecting pulley 6 and belt-wheel 7 on the inclined worm-shaft 8, secured at the lower part of the end of the machine stand.

Between two plates of the double disk 9 each of the spindles illustrated is provided with a fixed collar 10, and between the collars and the rear plate each spindle possesses an encircling coil-spring 11, acting normally to force the spindles toward an adjustable disc 12. That tendency of the spring is resisted by the engagement of the buttons 13, terminating the spindles at the rear, and the cam-groove 14 on the periphery of the stationary flat cylinder 15. This cylinder is secured to the pivoted frame 16 and does not revolve. When the shaft 17 in revolved, the buttons are compelled to follow the direction of the front wall of the cam-groove, and the spindles are withdrawn as each reaches the lowest position, allowing the work to drop out, and are shot forward again by the coiled springs when the step 18 in the front wall of the groove is met with. It is at this point that the work is caught between the centers from the chute at the rear. This chute is attached to and moves with the pivoted frame, and therefore preserves a constant position with respect to the orbital path of the spindles. The block at the lower end of the chute is held in such position that when the head-centers are shot forward by the coiled-springs, as explained, the block receives the point and chisels of the head centrally. Necessarily the position of the chute and the end piece that prevents the blocks from slipping off downwardly must be changed for blocks of different size. In practice a larger or smaller chute of like construction is substituted when required. When one block is taken up by the head-cutters, the remaining blocks are slightly disturbed; but as the revolution of orbital movement of the system of centers is then very slow the disturbance is only temporary and the blocks remaining slide down the chute, the bottom one taking the place of the one just removed.

PHILADELPHIA FOUNDRYMEN'S ASSOCIATION.

The 151st meeting of the Philadelphia Foundrymen's Association was held at the Manufacturer's Club on Wednesday evening, Nov. 1, with President Devlin in the chair. There were about 36 members and visitors in attendance. The report of the treasurer showed a balance of $1,951, and all bills paid to date.

O. P. Briggs, secretary of the National Foundrymen's Association, was present and gave a short address upon the present situation among the molders. He stated that he believes the majority of the workmen today are well-meaning men, that they should have equal rights with the employer and if the men who have the interest of every employer at heart are allowed to do as they please in their organizations, the difficulty will cease.

The paper of the evening was prepared by Wm. H. Coleman, of Chicago, and read by Dr. A. D. Snyder; the subject being the effect of high and low blast pressure in cupola practice. The paper will be published in *The Iron Trade Review* at a later date. Following the reading of the paper there was a general informal discussion in which the different members related various experiences bearing upon the subject. A vote of thanks was tendered to Mr. Coleman for the preparation of the paper, and to Dr. A. D. Snyder for presenting it to the society.

August William, president of the Philadelphia Foundrymen's Association, made a short address, setting forth the objects of the association and inviting foundrymen to attend the meetings.

Stanley G. Flagg then spoke of the present labor conditions in Philadelphia, stating that there were some 10 shops in which the molders and coremakers were out, that this was driving a large amount of jobbing work out of the city and it will be very difficult to ever get it back.

In the new method of steel melting at the Sheffield, England, works of Edgar Allen & Co., Ltd., the blast of air is introduced at the side, and not at the bottom, of the converter. There are two rows of tuyeres, the bottom row acting upon the molten metal only, and the top row on the gas evolved. With a pressure of blast up to 4 lb., not only is intense heat generated, but the metal is less disturbed than in other converters. Each blow occupies 20 min., the castings ranging up to 12 tons each. The installation comprises three 3-ton and two 25-cwt. converters, with a capacity of over 300 tons per week.—[The Engineering and Mining Journal.

NEWS FROM MANY INDUSTRIES.

New Buyers:—

The Old Dominion Bridge & Construction Co., Lynchburg, Tenn., has been organized with a capital stock of $300,000 to manufacture steel bridges and other structural work.

The East St. Louis Foundry Co., East St. Louis, Mo., has been incorporated with a capital of $40,000. The incorporators are: M. B. Nolan, Edward L. Cregan and R. B. Hendrichs.

The Mansfield Pattern Co., Mansfield, O., has been incorporated with $10,000 capital stock. The incorporators are: R. W. Hartman, Harry C. Brien, F. M. Reynolds, S. Glen Man and J. H. Donaldson.

The American Steel Wagon Co., Wilmington, Del., has been incorporated with a capital of $100,000 to manufacture steel wagons, cars, trucks and appurtenances and requisites for all kinds of vehicles.

The Damascus Brake Beam Co., Cleveland, has been incorporated with $25,000 capital stock. The incorporators are: Albert Waycott, Albert W. West, G. B. Siddel, L. S. Lomasson and John P. Dempsey.

The Wright Mfg. Co., Chicago, has been incorporated with $30,000 capital stock. The incorporators are: Edward E. Wright, Fred L. Watson, and Alonzo F. Allen. The company will manufacture machinery.

The Watertown Steel & Iron Co., Watertown, Wis., has been incorporated with $20,000 capital stock. The incorporators are: A. E. Baumann, Fred A. Hoffman, Ferdinand Schmutzler and J. E. Dornfield.

The Spring River Metals Co., Denver Colo., has been incorporated with $50,000 capital stock. The directors are: William Lennox, E. W. Giddings, O. S. Johnson, F. C. Smith and W. S. Morris, Colorado Springs.

The Cleveland Iron Works, Selby, N. C., has been incorporated with $10,000 authorized capital. The company proposes to conduct a general machine and repair shop and foundry. The incorporators are: T. H. Abernethy, T. W. Tucker and C. R. Hoe.

The Iron & Mining Co., Duluth, Minn., has been incorporated under the control of Ohio men, and is capitalized at $1,000,000. The officers are: Philip Agnew, president; F. J. Wick, vice president, and J. C. Agnew, secretary and treasurer. The cashier, A. T. Chisholm, is a Cleveland man.

The Detroit Tool Co., Detroit, Mich., has been incorporated to manufacture and market the Detroit combination tool, invented by Dr. J. W. Morrison and Harold W. Holmes, a senior engineer at Ann Arbor. Some of the features of the tool are a vise, pipe-vise, clamps, hardy tongs and a rotary blower forge connected with a geared drill. The company intends erecting a plant in the near future. The president of the company is William L. Holmes, and the vice president Dr. J. W. Morrison.

New Construction:—

The Philadelphia Iron Works, Philadelphia, Pa., has let the contract for an addition to its erecting shop.

The Solvay-Process Co., Detroit, Mich., is erecting a three-story machine shop 100 x 300 ft., at a cost of $100,000.

The Chicago Bridge & Iron Works, Chicago, will erect a one story machine and blacksmith shop, 108 x 159 ft.

The J. P. Rundle Mfg. Co., Layton park, Milwaukee, Wis., will ask for bids next week for the erection of four new buildings to cost about $30,000. A one-story addition 131 x 85 ft. will be made to the foundry; a smelting and refining building 50 x 40 ft., two stories high, a three-story building 99 x 41 ft. for brass finishing, and an office and shipping building, 50 x 60 ft. will be put up.

The Ajax Forge Co., Chicago, has leased a tract of ground at Blue Island and Hoyne avenues, where it will construct a large plant.

The Taylor Iron & Steel Co., Knoxville, Tenn., has let the contract for a 200-ft. extension to its steel foundry to the Eastern Steel Co.

The Fort Wayne plant of the General Electric Co., Fort Wayne, Ind., is to be increased by a new building which will double its capacity.

The Detroit Steel Pulley Co., Detroit, Mich., will erect a factory building 66 x 112 ft., the machinery for which and the power units have all been purchased.

The Carroll Barb Wire Fence Co., Peoria, Ill., has let the contract for a one-story brick structure 50 x 100 ft. which will be ready for use in about a month.

The Kittanning Iron & Steel Co., Kittanning, Pa., is to build a large coke plant at Mosgrove, Pa., where it has purchased several hundred acres of farm and coal lands.

C. A. Slaughter, of the Hunter Iron Works, Atlantic, Iowa, is looking for a site on which to erect an extensive plant for the manufacture of bridge and structural material.

The Kilbourne & Jacobs Co., Columbus, O., is erecting a new building for the manufacture of iron sinks. The company is working over time to keep up with orders.

Work has been begun on the factory building of the Geneva Foundry & Machine Co., St. Charles, Ill., and an effort will be made to have the building completed by Jan. 1.

Construction is progressing rapidly on the two buildings at the plant of the Springfield Boiler Co., Springfield, Ill. These buildings take the place of those destroyed by fire some months ago.

The Monessen Foundry & Machine Co., Monessen, Pa., is erecting a new machine shop 80 x 130 ft., and an addition to the foundry 50 x 72 ft. They will install two 10-ton traveling cranes.

The American Clay Machinery Co., Bucyrus, O., is building an addition 50 x 80 ft., with independent power plant. The new structure will be used for the manufacture of dry cars, transfer cars and turn tables.

The Fostoria Motor Car Co., Fostoria, O., will erect a plant at once, and will build 200 automobiles the first year according to agreement with the Board of Trade of that city. The company is capitalized at $300,000.

The J. A. Sundberg Co., Chicago, will erect a machine shop 45 x 100 ft., to be a part of the present forge plant. New equipment will be purchased early in the year. The company manufactures iron and steel forgings.

The American Cast Iron Pipe Co., Birmingham, Ala., will begin the erection of a $1,000,000 plant in the near future. It is expected that the buildings will be completed by April or May. Some 500 workmen will be employed.

The Wm. J. Oliver Mfg. Co., Knoxville, Tenn., intends to erect trolley car works which will cost in the neighborhood of $150,000. The buildings will be of steel and will be built on the site recently purchased from the Utica Desk Co.

The Youngstown Car Mfg. Co., Youngstown, O., is making extensive improvements to its plant, installing

complete equipment for the repair of standard gauge steel cars. When the work now in progress is completed, large shops will be erected.

The Fitch Morency Brass Factory, Sturgis, Mich., is nearly completed and the work of installing machinery has been begun. It is understood that a large amount of modern machinery, including a 50-h. p. Olds gasoline engine will be added later.

The Reder Foundry Co., Chicago, is erecting a foundry 90 x 91 ft., and a pattern shop 76 x 103 ft. and three stories high, at its plant at Canalport avenue and Johnson street. The buildings will cost about $40,000, and will be constructed of brick and steel.

The Northwestern Steel & Iron Works, Eau Claire, Wis., have just completed and put in operation their new plant. A large number of castings for concrete block making has been turned out. The plant is equipped throughout with modern machinery and tools.

The Iroquois Iron Co., Chicago, will probably erect two blast furnaces instead of one on the site recently acquired from the Chicago & Calumet Canal Dock Co. It is also reported that by-product coke ovens will be put up, bringing the total expenditure to almost $2,000,000.

The Dickson Car Wheel Co., Houston, Tex., is putting up a temporary frame structure to take the place of the one recently destroyed by fire. Day and night shifts will be worked to enable the company to catch up with back orders. About 200 wheels can be finished per day in this way.

The American Can Co. has just completed a new plant in Maine, and another is in course of construction on West Fourteenth street, New York. The plants to be erected in Savannah and New Orleans will be started soon. It is stated that the new buildings will be modern in every respect, and will largely increase the capacity of the company.

The Whitlock Coil Pipe Co., manufacturers of feed water heaters, automobile coolers and high pressure power plant piping, Hartford, Conn., has recently completed a two story brick building 50 x 200 ft., to be used largely for the manufacture of automobile coolers. It is expected that the new office building will be ready for use in a few weeks.

Fires.—

The foundry of the Grant-Ferris Co., Troy, N. Y., was gutted by fire Oct. 31.

Fire in the engine room of the Union Drop Forge Works, Chicago, Nov. 4 caused a loss of about $3,000.

The Wenzelmann Mfg. Co., Galesburg, Ill., sustained a loss of about $8,000 by fire Nov. 1, when the foundry was burned to the ground.

A stubborn fire which threatened the W. Dewees Wood plant of the American Steel Co., McKeesport, Pa., Nov. 9, caused a loss of about $2,000.

Sparks from an emery wheel caused a $5,000 fire Oct. 31, at the plant of the Valley City Machine Co., at Grand Rapids, Mich. The blaze started with the explosion of a can of benzine.

A hot flask left standing against the wooden partition at the plant of the Phoenix-Porter foundry, Syracuse, N. Y., started a blaze which caused a loss of about $15,000 Oct. 28. The damage has been replaced

An explosion in the stack of the furnace of the Elk Rapids Iron Co., Nov. 1, started a fire in the oil room which, for a time, threatened the destruction of the plant. The flames, however, were extinguished with little loss. Six car loads of charcoal standing on the tracks near the furnace were ignited but were saved from complete destruction.

General Industrial Notes:—

The new bar mill at the Toledo plant of the Republic Iron & Steel Co., will probably be put in operation this week.

An arrangement has been completed whereby the Page Fence Co., Adrian, Mich., bcomes the selling agency of the Lyon Fence Co., of the same city.

John Tregallis recently discovered iron ore on his farm near Norway, Mich. Assays show from 50 to 59 percent iron with only a trace of phosphorus.

The Ellis-Ford Mfg. Co., Detroit, Mich., recently organized with a capital of $50,000, has taken over the business of the Ellis-Ford Pipe Cutter Co.

The No. 3 puddling mill at the Brown-Bonnell works of the Republic Iron & Steel Co., Youngstown, O., has been dismantled and the equipment shipped to the plant at Massillon, O.

Turk & Co., and the Burrell Mfg. Co., Kankakee, Ill., closed down their foundry departments from Nov. 3 to 7, because of the delay in the arrival of some much needed material.

The Trenton Steel Works has been purchased by Frank D. Moses, Trenton, N. J. Repairs are now being made and it is the intention to place the plant in operation immediately.

The Sennet plant, Youngstown, O., will be equipped by the Harris Safety Co., New York, for the manufacture of fire escapes and other safety appliances. No new machinery will be required.

The machine shops of Beebe & Trimble are to be removed from St. Johns, Ore., to Kalama, Wash., where new machinery will be added, the plant enlarged and the name changed to the Kalama Iron Works.

The report of the Swedish Geological Survey estimates the workable iron ore fields at 10,000,000,000 tons. Germany is first with 2,200,000,000, Russia and France, 1,500,000,000 each, United States, 1,100,000,000 and Great Britain, 1,000,000,000.

The United Steel Screen Co., Jackson, Mich., will shortly move to Albion, where it will occupy the building formerly used by the American Harness Co. The company is capitalized at $200,000 and intends building for itself in the spring.

The De La Vergne Machine Co., New York, has established a branch agency at Atlanta, Ga., with W. M. Hargraves in charge. This agency will handle the machinery lines of the company in North and South Carolina, Alabama, Florida and Georgia.

A new company has been formed with M. Emile De Long, Brussels, Belgium, at the head, for the purpose of introducing into all countries a new machine for the manufacture of weldless chain. M. De Long is the inventor and sole owner of the new process.

The Automatic Boiler Cleaner Co., Jackson, Mich., has reorganized and increased its capital stock from $10 000 to $50,000, growth in business making an expansion necessary. O. F. Schmidt is president, Gilbert S. Loomis, vice president, and Harry B. Haywood secretary and treasurer.

The plant of the Pennsylvania Steel Co., Harrisburg, Pa., was inspected Nov. 3, by the president E. C. Felton; Fred W. Wood, president of the Maryland Steel Co., and F. C. Smith, president of the Reading Iron Co., and others of the party who visited the Maryland Steel Co. the day before.

The Shaw Crucible Co., recently incorporated at Hoquiam, Wash., with a capital of $100,000, is soon to begin the construction at Damon's point, of a plant for the manufacture of tool steel direct from the black sand found on the beach. A hotel and quarters for the officers and employes will also be erected. and the intention is to

have the entire plant in running order by early spring The officers are: S. B. Wells of Cincinnati, president; W. J. Shaw, general manager, and E. H. Rotherl, assistant general manager.

The directors of the Maryland Steel Co., Sparrows Point, Md., inspected the plant Nov. 2, and expressed themselves very well satisfied with the work which is being done. According to one of the directors, the company will probably authorize the expenditure of about $250,000 for improvements.

The Bessemer & Lake Erie Railroad Co., at Euclid, Pa., intends installing the system of track construction of the Truss Steel Tie Co., Pittsburg. Similar equipment has been put in by the Pittsburg & Lake Erie Railroad at McKees Rocks and in the New York subway near 148th street and Lenox avenue.

The Niagara Forge Steel Co., whose incorporation was mentioned in our issue of Oct. 26, will manufacture car trucks, special sections, combination tie plates, rail joints, rail braces, etc. The officers are: W. H. Woodcock, president and engineer; C. L. B. Tylee, vice president and treasurer, and George M. Stow Jr., secretary and general manager.

The Fort Worth Machine & Foundry Co., the Fort Worth Boiler Works and the Acme Metal & Machine Co., Fort Worth, Texas, have been consolidated into one concern with William Richmond as president; M. P. Ferris, vice president, and Charles E. Bowman, secretary. Well drilling outfits, gasoline engines, will be built and other machinery sold and repaired.

The American Bridge Co. has a large force of men at work on the boiler shops of the Harlan & Hollingsworth Corporation, Wilmington, Del. Work has been resumed on the railroad bridge of the Pennsylvania Railroad Co., at Havre de Grace. The fact that several of those working on the local contracts carry union cards, favors the opinion of the officials of the company that the strike will not last much longer.

The Metal Products Co., Seattle, Wash., which was incorporated some time ago, will be conducted under the management of Dr. A. O. Ingalls, for the purpose of mining the rarer ores and placing them on the market, and also mining molybdenite, tungstite, chrome iron, and iron ores, and manufacturing them into ferro-compounds and placing them on the market as such. An adequate manufacturing and smelting plant will be erected so soon as the tonnage of ore is fully demonstrated.

The Taylor Iron & Steel Co., High Bridge, N. J., at a recent meeting made several changes among the officers of the company. Robert E. Jennings, president of the Carpenter Steel Co., Jersey City, was elected to take the place of Lewis H. Taylor resigned. Percival Chrystie was chosen vice president and Knox Taylor general manager. Mr. Taylor's resignation has been very reluctantly accepted and in so doing the board has unanimously elected him honorary president.

The Model Gas Engine Works, Auburn, Ind., now under the management of J. W. White and others of Fort Wayne, Ind., will be removed to Peru. The company manufactures gas and gasoline engines and automobiles, and at the present time has large orders booked for shipment to Los Angeles, Cal.; Chilhuahua, Mexico; City of Mexico, Cuba and Java. The city of Peru has given the company a bonus of $20,000 and five acres on which to erect a plant.

At a recent meeting of the Youngstown Sheet & Tube Co., Youngstown, O., the following officers were elected: James A. Campbell, president; H. G. Dalton, Cleveland, vice president; Richard Garlick, treasurer; George E. Day, secretary and general sales agent, and W. B. Jones, auditor. Mr. Campbell reported that work on the new Bessemer steel plant was very satisfactory and it would probably be making steel by July, 1906. It will have a capacity of about 1,500 tons a day.

Under the management of W. D. Crawford, October was a record month for the La Belle Iron Works, Steubenville, O. A total of 32,710 gross tons was made by the open hearth plant against 30,135 tons in May, the best record up to that time. During the month 70 heats were made by furnace No. 1, producing 4,230 tons of steel, which is claimed is a world's record for a 50-ton basic furnace. A total of 27,456 tons of ingots was rolled by the blooming mill as against 26,000 tons, the best previous record.

George G. Blackwell, chairman of George G. Blackwell, Sons & Co., Ltd., who is now touring the iron and steel section of the United States, reports that his firm first introduced the high grade 25%, 50% and 75% electrolytic ferro-silicon to the trade as more economical than the lower grades round about 11% and as introducing fewer impurities into steel. A number of calcium carbide plants, he explains, were changed to the manufacture of this grade and eventually a syndicate was formed. The Blackwell ferro-silicon works, however, are independent.

One of the ladles at blast furnace A of the Riverside department of the National Tube Co., Benwood, W. Va., recently exploded with such violence that many windows in neighboring buildings were broken. The explosion was caused by the breaking of the connection between one of the ladles and the engine used to convey the load of molten iron from the ladle shed to the piggery. The last ladle on the track ran into the wall of the shed, the molten iron splashing over the wet ground. No one was seriously hurt, although the engineer and several workmen narrowly escaped the hot iron.

Trade Notes:.—

The Leighton-Howard Iron Plant of the American Steel Foundries, at East St. Louis, is to reopen at once after an idleness of several months.

Moran Bros., Seattle, Wash., have obtained the contract for the construction of a steel steamer of 1,500 tons register for the Pacific Coast Steamship Co.

Sales of the Allis-Chalmers Co. for October reached the $2,000,000 mark, the highest in the history of the company. One large order was for $360,000 worth of mining machinery for a Brazilian firm.

The Inter-Ocean Mining Co., Colo., through H. S. Merrill, has contracted with the Bass Foundry & Machine Co., Fort Wayne, Ind., for two 100-h. p. boilers and a Corliss engine for use in the cyanide mill to be erected at Sunshine, Colo.

The Page Boiler Co., Chicago, is about to contract for buildings and equipment for the manufacture of a general line of boilers and a number of specialties. M. E. Page Jr., is president and manager, and John J. Johnanson is vice president and superintendent.

The Independent Pneumatic Tool Co., Chicago, reports an unprecedented number of orders for Thor pneumatic tools and appliances during October. One cable order from an English concern included 200 piston air drills, reversible wood boring machines and pneumatic riveting and chipping hammers of various sizes. There is also a great demand for pneumatic tools from railroads and industrial works in this country. On account of this increase in business the company intends to enlarge its plant at Aurora, Ill., and is now purchasing a large amount of new machinery for installation therein.

TRADE PUBLICATIONS.

The Armstrong Mfg. Co., Bridgeport, Conn., has issued a catalog describing the Armstrong stocks and dies. The catalog shows a complete line of hand tools and also a number of pipe machines, pipe fitters' vises and other tools.

The Berger Mfg. Co., Canton, Ohio, has issued a catalog describing its Spanish tile roofing. This tile is made of pressed steel in various sizes and shapes and presents a handsome appearance. It is being largely used on public buildings and residences. It is very artistic and at the same time permanent and lasting.

R. D. Nutall Co., Pittsburg, Pa., has issued a catalog illustrating part of the plant and products of the company. The illustrations show gear boring and turning department, gear cutting department, small gear department, large gear department, power plant and various types of gears, including pinions, large cut gears, bevel gears, sectional gears, trolleys, sleet cutters for trolley lines, etc.

The American Blower Co., Detroit, Mich., has issued a catalog describing the "A. B. C." heater for use in heating and ventilating systems. The catalog shows a number of views of the heater with and without casings, and also erected in conjunction with fans and blowers for forcing the air through the buildings, together with tables of dimensions and price list. The catalog comprises 30 pages, and is well printed and handsomely illustrated.

The Dayton Pneumatic Tool Co., Dayton, O., has issued an illustrated catalog describing its line of "Green" pneumatic hammers. Chipping, caulking and riveting hammers of two classes are shown, together with illustrations showing the work done by them. The use and care of the hammer, together with the descriptions of the chisels and rivet sets, and directions for assembling and taking apart the hammers are also given. The company will be pleased to mail a copy of the catalog to those interested, upon request.

F. Wesel Mfg. Co., Brooklyn, N. Y., has issued a handsome book entitled "Twenty-five Years." This commemorates the 25th anniversary of the founding of the company's business. It contains photographs of the offices of the company and of the shop, showing both interior and exterior views. Some of the interior views show the power plant, the planer room, store room, small tool room, patternmaking department, erecting department and printing and advertising department. The F. Wesel Co., manufactures, principally, machinery for printers' and electrotypers' use.

Watson-Stillman Co., New York, in its new catalog No. 67, describes and illustrates hydraulic accumulators and fittings. This catalog contains about 50 pages and includes descriptions and illustrations of pump governing accumulators, hydraulic accumulators with suspended platforms, reversed cylinder accumulators, differential ram accumulators or sugar roll governors, hydro-pneumatic accumulator, and double tandem cylinder intensifier, together with descriptions of valves, shock alleviators, hydraulic pipe, and hydraulic press packings. The company states that to its knowledge no similar catalog has ever been issued, and that several of the cuts in this catalog are entirely new as is the matter relating to them.

The Wellman-Seaver-Morgan Co., Cleveland, O., has issued a catalog describing its high-speed efficiency cranes, both standard and special types, double trolley ladle cranes, electric single trolley ladle cranes, standard and special electric overhead traveling cranes for general purposes, standard locomotive cranes and gantry and yard cranes, together with descriptions and illustrations showing the different parts of the cranes. The catalog is well illustrated, and shows the double trolley ladle crane as installed at the Illinois Steel Co.'s South Chicago plant, the 40-ton double trolley hot metal crane with 10-ton auxiliary trolley at Carnegie Steel Co.'s South Sharon works, the high-speed three-trolley traveling gantry crane, at Lackawanna Steel Co.'s plant, Buffalo, N. Y., and the 75-ton folding jib gantry cranes as installed in the plant of the Fore River Ship & Engine Co., Quincy, Mass., together with numerous other illustrations showing the crane as installed in various steel plants. This catalog contains about 30 pages, the last two of which are given over to a list showing some of the Wellman-Seaver-Morgan Co.'s cranes, together with their capacity, number and type.

Laidlaw-Dunn-Gordon Co., 114 Liberty street, New York, has recently published a 32-page bulletin describing the improved Cincinnati air compressor. This is characterized by a new and simple air-valve mechanism by which the elasticity of poppet valves is combined with the quiet action, efficiency and high-speed qualities of positively operated valves. This enables the machine to be directly connected without gears or belts to electric motors and gas engines. The circular describes the adaptation of this compressor to different methods of driving and to different types of steam ends, such as a simple and compound, Corliss, etc.

Tate, Jones & Co., Inc., Pittsburg, are circulating a handsome catalog presenting the advantages of oil as fuel for vessels. This catalog is printed in three colors and is profusely illustrated with wash drawings showing the development of vessels from the ship of the Vikings to the vessels of today, including ocean steamers, passenger steamers, warships, ferry boats and tugs. Other illustrations cover typical equipments showing the method of piping, and some of the burners, oil pumps and other principal parts. The catalog contains about 20 pages and is well printed on fine paper, having for its front cover a picture of an old ship of the style used about the time of Christopher Columbus; while its back cover shows a steamship with all modern equipments. Some of the pages are given over to tests which have been made by various companies, and letters from ship owners which concisely state the economies and advantages of oil fuel, are also incorporated therein. Record runs with oil as fuel are described in detail, together with a quantity of information of value to ship builders and shipowners. This catalog also contains a folder showing a plan and sectional elevation of a vessel arranged to use oil fuel in the boilers.

The Jeffrey Mfg. Co., Columbus, O., has issued catalog No. 10, describing and illustrating its different types of mine locomotives. The catalog consists of 68 pages and contains descriptions of both single and double end control Jeffrey electric mine locomotives in all sizes, the Jeffrey electric gathering locomotives, Jeffrey rack rail locomotives and Jeffrey storage battery locomotives. The illustrations show the Jeffrey 10-ton electric mine locomotive as operated in the plant of the Pittsburg Gas Coal Co., the Jeffrey mine locomotives, in their earliest types in the Upson Coal Mining Co., the Jeffrey six-ton single end control electric gathering locomotive as installed in the Wheeling Steel & Iron Co.'s plant, the eight-ton single end control electric gathering engine in the plant of the United States Coal & Coke Co., the Jeffrey 14-ton single combination rack and rail friction traction locomotive, and Jeffrey six-ton single end control electric storage battery locomotive hauling 54,000 pounds trainload of Anodes, at the Buffalo Smelting Works, together with a large number of locomotives as installed in different plants. The catalog also contains a photograph of the office and works of the Jeffrey Mfg. Co., at Columbus, O., together with a number of tables of dimensions of the locomotives.

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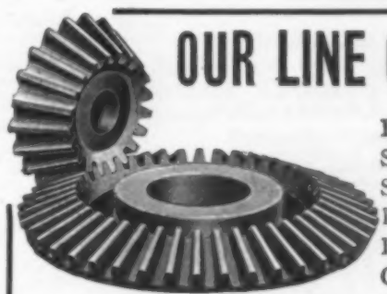
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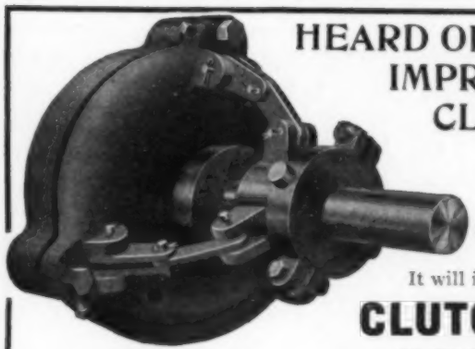
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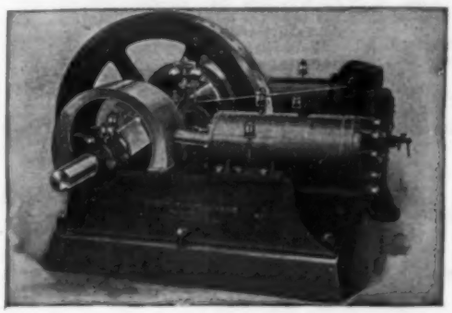

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United Engineering & Fdy. Co., Pittsburg, Pa
Union Foundry & Machine Co., Pittsburg, Pa.

Tool Holders—
Armstrong Bros. Tool Co., Chicago, Ill.

Tool Racks—
New Britain Machine Co., New Britain, Conn.
Bullard Machine Tool Co., Bridgeport, Conn.
Jones & Lamson Machine Co., Springfield, Vt.
Niles-Bement-Pond Co., New York.

Tool Steel—
Armstrong Bros. Tool Co., Chicago, Ill.
Bourne-Fuller Co., Cleveland, O.
Colonial Steel Co., Pittsburg, Pa.
Arthur C. Harvey Co., Boston, Mass.
Wm. Jessop & Son, New York City.

Transmission Equipment (Power)—
T. B. Wood's Sons, Chambersburg, Pa.

Tropenas Process—
Powell & Colne, New York City.

Trucks, Cars and Barrows—
Atlas Car & Mfg. Co., Cleveland, O.
The Cleveland Car Co., West Park, O.
Hill & Griffith Co., Cincinnati, O.
Arthur Koppel Co., New York City.
The Meehan Boiler & Construction Co., Lowellville, O.
Northern Engineering Works, Detroit, Mich.
S. Obermayer Co., Cincinnati, O.
Russel Wheel & Fdy. Co., Detroit, Mich.
The J. D. Smith Fdy. Supply Co., Cleveland.
Turner, Vaughn & Taylor Co., Cuyahoga Falls, Ohio.
The Wellman-Seaver-Morgan Co., Cleveland, Ohio.

Tubes—
Bourne-Fuller Co., Cleveland, O.
S. Fix's Sons, Cleveland, O.
Globe Rolling Mill Co., Cincinnati, O.
National Tube Co., Pittsburg, Pa.
Joseph T. Ryerson & Son, Chicago, New York and Pittsburg.
Scully Steel & Iron Co., Chicago, Ill.
Shelby Steel Tube Co., Pittsburg, Pa.

Tube Welding—
S. Fix's Sons, Cleveland, O.

Tumblers—
The Adams Co., Dubuque, Ia.
The Globe Mach. & Stamping Co., Cleveland, O.
Hill & Griffith Co., Cincinnati, O.
Northern Engineering Works, Detroit, Mich.
The S. Obermayer Co., Cincinnati and Chicago.
J. W. Paxson Co., Philadelphia, Pa.
The J. D. Smith Fdy. Supply Co., Cleveland.

Tungsten (Metal and Alloys)—
Beaver Metallurgical Co., Beaver Falls, Pa.

Turnbuckles—
Bourne-Fuller Co., Cleveland, O.
Cleveland City Forge & Iron Co., Cleveland, O.
A. G. Hathaway & Co., Cleveland, O.
New Jersey Fdy. & Mach. Co., New York City.
Republic Iron & Steel Co., Chicago, Ill.

Twist Drills—
The Cleveland Twist Drill Co., Cleveland, O.

Vises—
Hanna Engineering Works, Chicago, Ill.
Merrill Bros., Brooklyn, N. Y.
Wyman & Gordon, Cleveland, O., and Worcester, Mass.

Washer Machines—
National Machinery Co., Tiffin, O.

Washers—
American Iron & Steel Mfg. Co., Lebanon, Pa.
Avery Stamping Co., Cleveland, O.
Milton Mfg. Co., Milton, Pa.
Upson Nut Co., Cleveland, O.

Water Softening Plants—
Harrison Safety Boiler Works, Philadelphia.

Wire (Cable and Rope)—
Lidgerwood Mfg. Co., New York City.

Wire Nail Machinery—
National Machinery Co., Tiffin, O.